

amateur radio

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA



VOL. 46, No. 6

JUNE 1978

CONTENTS

TECHNICAL

Afterthoughts	7
A Phase Modulator for 2 Metres FM	14
An Ultra Low Noise FET Vidicon Amplifier	18
Commercial Kinks	25
Equipment Review — The ICOM IC225	23
More Power for the Ken KP202	13
Try This	15, 21
Two Dummy Loads	12

GENERAL

AOCPE Exam August 1977	47
Goodwill Through International Amateur Radio	25
Mt. Ginini Repeater Stolen	37
Ratbag CBers on Rampage	25

This Affects You	7
VK-ZL Oceania DX Contest Results 1979 (Overseas Stations)	44
WARC 79 Fundraising	30
Woollara Amateur Radio Club Field Day Activity	30
1978 Federal Convention Pictorial Roundup	24

DEPARTMENTS

Amateur Satellites	31
Around the Trade	45
Awards Column	52
Coming Events	53
Contests	30
Divisional Notes	53
Hamads	45
IARU News	53
Ionospheric Predictions	47

LARA	53
Letters to the Editor	34
Magazine Index	52
QSP	3, 7, 13, 21, 30, 31, 45
Repeaters	36
Silent Keys	54
VHF-UHF — an expanding world	42
WIANEWS	5
WICEN	52
20 Years Ago	53

COVER PHOTO

Captain Tanongsak Turvun of the Royal Thai Army (left) is presented technical literature by Ian Hunt VK5QR (right) on behalf of the VKS Division. Supervising the event is Bob Edgar VK5RS (left rear) and Ron Catmur VK5FY (right rear). See story "Goodwill Through International Amateur Radio", page 51.

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amateur radio

Published monthly as its official journal by the Wireless Institute of Australia, founded 1919.

JUNE 1978

Vol. 46, No. 6

PRICE: 90 CENTS

(Sent free and post paid to all members)

Registered Office:

27517 Toorak Road,
Toorak, Victoria, 3142.

Registered at the G.P.O. Melbourne for transmission by Post as a Periodical — Category "B".

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QSP — NEW ERA

The Federal Council meeting at the 1978 Federal Convention, realising that this is an era of intense technical and community changes, decided that more thought must now be given to the years following WARC 79.

Much needs to be done to fit the WIA to the requirements of the membership which is now much more diverse in technical interests.

Many views about the future have been expressed by individual members and it is these which are most important in forward planning. Have you made your views known?

It must be recognised that WARC 79 is not an ending, but is in fact the beginning of a new era.

D. A. WARDLAW VK3ADW
Federal President

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WIANEWS

At this time of the year the Federal Convention occupies the thoughts of Australian amateur administrators. The usual report will be published in AR next month, but it would be useful to refer to some of the more important items here and now.

The guest of honour this year was Mr. E. J. Wilkinson, the First Assistant Secretary of the Radio Frequency Management Branch of the Postal and Telecommunications Department. Mr. Green, the Secretary of the Department, regretted inability to attend due to other commitments. A letter RB4/11/31 of 21st April from him arrived during the Convention. The text of this letter is as follows:

"Thank you for your letter of 31 March 1978 concerning matters associated with the examination of candidates for the Novice Amateur Radio Operator's Certificate of Proficiency.

The study guide prepared by the Institute has now been examined in relation to the official Department Syllabus: as a consequence it is considered that the study guide is suitable for use by intending candidates for the Novice qualification.

A copy of the Department's Syllabus in its final format is attached for your retention. I expect that quantiles of this document will be available for distribution in the near future."

Mr. Wilkinson answered a range of questions put to him by the Convention delegates on numerous amateur radio matters. In his short introduction he spoke about preparations for WARC 79 dominating the frequency management scene at this point in time and complimented the Institute upon the case presented to the APG on behalf of the amateur service. The Citizens' Radio Service had presented the Department with a serious problem of sheer numbers overloading the system. Legalisation of the service had changed the overall picture but lawlessness through piracy still continued and highlighted the inadequacies of the legislation. It was hoped that the introduction of a new Act might now be expedited, but the best estimates placed the date around autumn of 1979.

After dealing with various aspects of the amateur examinations area, Mr. Wilkinson expressed the concern of Government about the ease of acquiring transmitting equipment and the studies currently being made into this question.

No easy solution appeared available.

In answer to numerous questions he spoke about interference to the operation of consumer equipment brought about by the proliferation of "CB" gear, the morse speed problems in Novice exams being appreciated and now at the point of being resolved, the various problems relating to TV channels O and 5A being unlikely to be resolved for a considerable time, the fact that the CRS must be more self regulatory within its own frequency allocations.

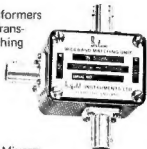
The Department recognises that interference with repeater channels is essentially one for the Department, but help from amateurs is required to detect the offenders, collaboration was the real answer to the nuisance, UHF broadcasting allocations being related to WARC 79 and the fact that the Department did not recommend continuance of the use of the 11 metre band by the CRS beyond June 1982.

The Convention heard reports from Mr. Michael Owen VK3KI, and Dr. Wardlaw on the subjects of WARC 79 and IARU. Provision was made in the budget for the latter's attendance at important conferences. He and Mr. Peter Wolfenden would be attending the IARU Region 3 Conference in Bangkok later this year in which numerous questions would be down for consideration including the IARU position post WARC 79. The importance was stressed of the Special Planning Meeting of the CCIR in October, which related to technical matters affecting WARC 79.

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Mr. AlI Chandler VK3LC attended the Convention and spoke with some feeling about the paucity of support in Australia for Intruder Watch operations. He paid tribute to the work done in this sphere by the USA and the UK administrations, whereas in Australia it seemed the case that reports of an intruder from a few observers passed unnoticed.

During the Convention the RD Contest trophy, refurbished and gold-plated by the VK5 Division after being rescued from the wreckage of Darwin's Cyclone Tracy, was formally handed over to VK1 Division, the winners last year. A motion was passed that this become an annual convention event. In discussions on the RD Contest the fact emerged that an in-depth statistical evaluation of the scoring table was desired. Peter Brown's Contest Champion Trophy was also on display and evoked discussion. The VK2 delegate advised that as it was that Division's turn to manage the Federal Contests, an offer by the Orange and District ARC to undertake this important work was accepted. Neil Pentfold VK6NE was congratulated upon his management of the VK/ZL/O Contest biennially with NZART and was thanked for his continuing interest in this contest.

A number of working groups were appointed for speeding up the work of the Convention in the specialised areas relating to repeaters, educational matters in general, ATV, IARU/WARC 79 and the Financial Sub-Committee previously appointed last year. It proved possible for experts or alternate Councilors in every Division except VK6 to be represented on the more important working groups. Only VK6 was represented by one delegate, all the other Divisions had at least two.

In discussing the work of the Federal Historian, mention was made of the very recent publication of "A History of Radio in South Australia, 1897-1977", by John F. Ross, which included a lengthy section devoted to the Wireless Institute and another book recently launched by Gp. Capt. E. R. (Bon) Hall on the RAAF radio story. In the debate on Max Hull's report stress was laid on the necessity for members to keep the Institute in mind whenever an Old Timer passes on lest any historical records and possessions are unknowingly thrown away into the local tip by the deceased's family.

A motion arising from the VHF/UHF Advisory Committee's report was the expression of thanks to John Hackworth VK5OZ for continuing with his faithful work in calculating distances and invigilating activities relating to DX records.

Discussions on the report by the Chairman of the Federal RTTY Committee brought out the necessity of avoiding unilateral action by individual Divisions or Groups on RTTY matters in advance of general acceptance at the Federal level.

Apathy by members in general in relation to WICEN affairs was one question debated at some length on the report by the Federal WICEN Co-ordinator. Regret was expressed that Rex Roseblade VK1QJ would be standing down from this post after achieving so much with NDO liaison in particular.

The report by the Chairman of the Publications Committee and matters arising from this brought out several points relating to AR, the Call Book and the Log Book. The Managing Editor, Bruce Bathols VK3UV, expressed disappointment at the interest of members in their own magazine; as for example the dearth of photographs (especially front cover photographs) and that there was a limit to the amount of work which can be done by the volunteers on the Committee. Some time was taken up in a working group on the question of any competition from the Amateur Radio Action publication to be published shortly. The 1977 Call Book came in for considerable criticism, but all the points were already known.

Another working group dealt with the Agenda Items relating in general to organisational matters, recruiting and publicity. One motion arising from this area was the need to solicit funds for WARC 79 from all available outside sources. Another was the current payment of separate licence fees where different modes are operated on the same site — for example, beacons, repeaters, etc.; further details are needed from users.

The Federal Council agreed upon the necessity for the Federal President and IARU Liaison Officer to attend the NZART Conference 1978 during June to seek solidarity between the two sister organisations relating to WARC 79 and IARU affairs in general. Mention was also made of a CCIR Regional Conference to be held in Australia early next year. The Federal President advised he had been invited to attend the CCIR SPM in October as a member of the Australian delegation.

In a discussion on the 1979 budget it was decided that no final decision relating to Federal dues should be made before the end of August, although on available information no increase appeared necessary for the third year in succession because of increased membership and continuing economies. The vital needs to increase the impact of recruiting, to provide services to members and to promote amateur radio generally throughout the community were examined in depth, targets identified and concerted action promoted. The production of promotional and display material is to be followed through without delay. Small identity stickers for cars were considered necessary but promotional bumper/window stickers were not favoured. It was agreed that for future conventions the central organisation should pay for the attendance of one alternate Councilor from each Division to the same extent that the expenses of the Federal Councilor are now paid.

The Federal Council elected the same Executive members for 1978-79 as in 1977-78, with the exception that John Bennett VK3ZA replaces Jim Lloyd, now transferred away from Melbourne. The 1978 Convention will be held in Melbourne at the same venue from 28th to 30th April.

Unfortunately, time is not available to go into further detail at this stage but many members will want to know the fate of the numerous Agenda Items relating to Novice operations. The motion to approach the Department to have the Novice segment on 80 metres extended up to 3625 kHz was passed by a majority vote, but all the other items relating to a common band for all licensees in particular, higher power, etc., were rejected after considerable debate. One of the strongest arguments in the selections was the incentive for Novices to upgrade.

During the Convention videotapes in colour were viewed of the material listed in WIA NEWS last month (May AR, page 6). The dates of showing for the HSV7 amateur programme became available at the Convention and will no doubt be referred to in Divisional broadcasts.

A reply has been sent to the Department in relation to the conditions to be imposed on the operation of 10 metre band beacons.

During April a letter arrived from the Minister for Post and Telecommunications and is reproduced hereunder for the information of members —

"I refer to your letter to my predecessor, the Hon. E. L. Robinson, M.P., regarding matters of concern to the WIA which you believe have flowed from the introduction of the Citizens' Radio Service (CRS) in Australia. I note that you are more particularly concerned at the apparent extent of illegal radio operations and the alleged inability of any Department to control such operations. I am aware of those representations made direct to my Department by the Institute some time ago in the matter and note also that you were of the opinion that these had not seemed to have received appropriate consideration, perhaps because of the pressure generated as a result of the introduction of the CRS. In point of fact, however, I am informed that in the meantime some of the issues raised by the Institute have been answered in letter form or have been the subject of ongoing discussions between representatives of the WIA and my Department. I am also advised that arrangements have been made for the outstanding issues to be further discussed in a joint WIA/P. and T. Department consultative Committee which is now to be set up.

Needless to say I appreciate the anxiety expressed by the Institute at the apparent extent of illegal radio opera-

tions and the difficulties being faced in controlling such operations. Regrettably, the Wireless Telegraphy Act and Regulations, the legislation under which radio communication stations are authorised in Australia, presently contain no provision to enable restrictions to be imposed on the importation or sale of radio communications equipment in this country. I should mention however that the question of the measures it is necessary to introduce to provide for an effective measure of control to be exercised in this matter is currently being examined.

I can appreciate your concern at what you believe to be an intolerable degree of radio frequency lawlessness

evident in Australia, especially in the 27 MHz region of the spectrum. It is true that this situation has been due to some extent to the current staffing situation in my Department. The situation has also been aggravated by problems which have stemmed from industrial grievances and disputes. I am confident, however, that as a result of action which has recently been initiated, resources will become available which will enable an adequate measure of control to be exercised over such services.

Yours sincerely,
Sgd. A. A. Staley."

THIS AFFECTS YOU!!

The following letters are reproduced in prominence due to the urgent messages they contain.

The Channel 5A problem is only one of the multitude of items which the WIA is trying to cope with — to date without much success.

We need the support of ALL amateurs in becoming members of the WIA, to provide a UNITED FORCE in protecting our frequencies.

Forget any previous backbiting, silly squabbles, etc. — your frequencies are continually under threat, from many sources. Look at the CB fiasco.

Show this page to a non-member, and if it doesn't make him/her want to act and join the WIA, then he/she might just as well forget amateur radio as a hobby — it just won't exist if we cannot use our frequencies.

5/4/78.

The Editor,

Dear Sir,

Please find enclosed a letter received here from the Prime Minister in relation to the proposed Channel 5A at Mt. Dundas. Please print it in its entirety to allow the local population of Western Victoria Amateurs to absorb the information.

I have heard comments from "technically competent" persons that an offset in the video and sound carriers will minimise the interference problem. The reasons for offsetting these is to avoid co-channel beat with Loxton, S.A., and Wollongong, N.S.W., just like the Channel O system. Beware the "Ides of March 1980" when all translators in the west will take the parent Channel 5A and the proposed Mt. Arapiles site is included in this proposal. No matter where you are in the west somewhere, sometime you will interfere with the TV system. This includes FM operators, both mobile and base. In fact it is more likely that FM will suffer than SSB. For those who still don't believe, ask anyone in Wollongong or Newcastle, or ask Hughie VK5BC next time you hear him on, and I assure you that won't be 2 metres.

So much for WARC 79. Here is a slice of an International band ripped out from under Amateurs for the fourth time in Australia.

With three non-standard channels in the six metre and four in the two metre band, we head the world in technical prowess.

Steve Gregory VK3OT.

Prime Minister,
Canberra.

21 March 1978.

Dear Mr. Gregory,

Thank you for your letter of 16 December 1977 concerning the proposed national television transmitter on Mount Dundas.

I have been advised by the Minister for Post and Telecommunications that the transmitter will operate on channel 5A. The decision to use this channel was reached after considerable engineering studies. The Minister advised that, bearing in mind the number of services that will be provided in the area and the lack of available frequencies, it is considered that there is no suitable alternative available.

While it is very unlikely that interference will be caused to amateur radio, I am informed there is a likelihood of occasional interference to the television reception of residents living in close proximity to an amateur radio installation. The Minister has advised me that if this occurs, it may be necessary to limit the hours of operation of amateur radio as has been the case in other areas where channels O and 5A are being utilised.

Yours sincerely,
Malcolm Fraser.

Mr. S. Gregory,
3HA, Hamilton,
P.O. Box 414,
Hamilton, Vic. 3300.

WHAT THE PRESS SAYS— "THE 5A CHANNEL"

The use of the 5A channel for ethnic telecasting and other special needs is a very practical proposition. All the feasibility tests have been made already, and it can be received without adjustment by most receivers in Melbourne.

The channel is, in fact, the emergency/disaster channel and its everyday use for ethnic, special and educational purposes should be no problem for a Government determined to honor its election promises.

Should a national emergency situation occur it would instantly revert to the original use for which it was intended.

The alternative would be to allocate a channel in the UHF band, more expensive but in line with global TV development.

QSP

PIRATES

"Everybody worth their salt that's around today is up on 27.235 you know, or on two metres. You've got 500 channels to choose from, they've got the use of repeaters and everything, you might as well get up on Two and enjoy yourself", Robert Carruthers being interviewed in CB Action magazine. Carruthers is a self-confessed pirate. The interview is quite an interesting one but is a bit hard on the blood pressure of the amateur. The Robert Carruthers bod is the "inventor" of the jamming device, which had quite a bit of publicity in the press recently, to counteract the effect of the next door CBR on your TV. First issue SWARS "Feedback" from VK2NPI.

DAFT MOONBOUNCE

The Dafto installation was severely damaged by vandals some time before 8th February and again a week later. Locks were broken, windows smashed, wiring removed, cabling ripped out, the floor holed, items stolen and a fire lit in one of the rooms. On 2nd March the site was inspected with representatives from the University and the decision reluctantly made that adequate security on the site was not possible especially as the dish is too vulnerable. This item may now be removed, if possible, elsewhere. Thus ends the Dafto Moonbounce Project after some 8 years of work. One readily identifiable item stolen was a brass mouse key mounted on a varnished wooden base, another was a 240V Selsyn about 4 inches in diameter, painted grey. Report by Lyle VK2ALI in "The Propagator", Mar. '78.

NEW PREFIX

Radio Commun. Dec. '77 quotes the ITU as having allocated the callign series P4A-P4Z provisionally to the Netherlands Antilles.

WARC 79 WARC 79 WARC 79 WARC 79

USE THEM
OR
LOSE THEM

WARC 79 WARC 79 WARC 79 WARC 79

AFTERTHOUGHTS

SCANNER FOR THE KYOKUTO SXR11
APRIL AR 1978

The 0.025 uF capacitor between pins 10 and 11 of ICB should be 25 uF.

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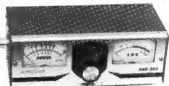
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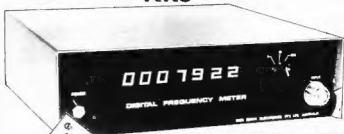
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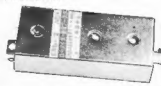
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TWO DUMMY LOADS

M. N. O'Burill VK3WW
3 Maxwell Street, Lator 3075

Dummy loads are essential in any shack where transmitter experiments are made. The two loads described here are easy to build and present a resistive load to the transmitter throughout the HF bands. Even at VHF the reactive component is small and insignificant in most cases.

The first load was made of ten 750 ohm resistors in parallel. As the picture shows they are soldered in a "ladder" style to two copper strips. One copper strip connects to the co-ax input and one to frame — in this case the lid of a coffee tin.

You can use any type of co-ax socket that suits — I have added a banana socket for RF pickup should I need it, for power measurements etc.

The resistors measure 3 cm by 1 cm and should be good for at least two watts each, thus making the load good for 20 watts. Of course, this is not enough for the average HF transceiver used today so the trick is to fill your coffee tin with transformer oil, put the lid on and your re-

sistors dissipate their heat into the oil. Most commonly used rigs won't even make the tin warm.

I picked up the resistors in a disposals shop, but there is no reason why ordinary carbon resistors can't be used. The higher their "dry dissipation" rating the better.

Transformer oil is not widely advertised but is used industrially by engineering firms, oil refineries etc. The oil used must have no metallic content so most motor oils are unsuitable. I think some of the vegetable oils sold in supermarkets would be OK but I haven't tried them.

A word of warning: Before putting oil in the tin carefully solder all seams or the oil will seep out.

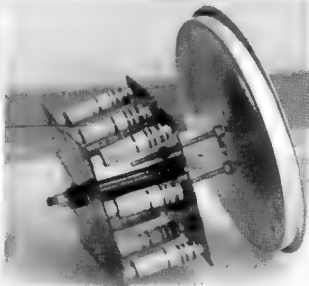
The second load consists of nine 470 ohm resistors in parallel giving a load of 52 ohms. In this case the resistors are soldered to two copper plates about 2½ in. square. The lower plate connects to the co-ax input and the upper plate is mounted to the lid of the can. The plates were made from an offcut of 2½" pipe which I split and flattened out.

I have not drawn any diagrams as these are very simple projects and the photographs show the layout well enough.

It would be hard to build any other piece of test equipment as cheaply as these two loads and they are very useful in the shack.



52 ohm load



75 ohm load

MORE POWER FOR THE KEN KP202

Fred Stirk VK2ABC
184 Park Parade, Beacon Hill, N.S.W. 2100

Let's face it, the batteries don't last all that long with the Ken KP202 unit and they always expire when you want them most! The adaptor unit described here goes a long way to overcoming some of the problems. The batteries can then be used for purely pedestrian activities.

The idea is to run the Ken from the car battery and generator combination. Not me, you say; well! that's how I figured it at first, but then thought there must be a safe way of doing it. This is the result.

To begin with, the most important point is the output of your car generator. If you can't do it yourself have a qualified auto electrician adjust the regulator so that the voltage across the battery will not rise beyond 14.2-14.3 volts at a reasonable r.p.m. of the motor. The battery and all connections must be first class so that there is no possibility of sudden voltage variations. Having arranged the voltage regulator so that around 14.2 is read at the cigarette lighter, plug in the adaptor and check the output with an accurate meter using a 200 ohm load. The voltage should vary from approximately 12.0 to 12.8 with speed variations when the adaptor is switched to LO. This will be satisfactory for the battery supply as fully charged Nicad batteries rise above 13.5V before being used. The 200 ohm load represents the Ken when receiving. The consumption rises to over 100 mA on receive with higher output levels.

Connection to the Ken is made via a DC power plug/socket combination using a socket added to the side of the Ken case adjacent to the press to talk switch. Care is needed in locating this socket as space is very limited on the inside of the case. Wire the socket so that the internal battery supply is broken when the DC plug is inserted. (See picture.)

The circuit is very simple but appears satisfactory in use providing the input voltage is controlled within the limits mentioned.

OPERATION

The operation is as follows. The on/off switch is used for obvious reasons and in the ON position lights a red LED via a 1000 ohm resistor. Battery voltage is then available for the HI/LO switch which in

the LO position supplies power via two EM401 diodes in series, or similar LV diodes of about 1A rating. The voltage drop across each diode will be about 0.7-0.8V so the supply will now be in the 12.0-12.8V area. To hold this with some assurance to approximately 13V maximum, a Zener diode is fitted across the output. Actually 5.8 and 6.2V units in series were used in the original and have proved satisfactory.

In the LO position, power is supplied to a green LED indicator via a 330 ohm resistor. The resistors to the LEDs were chosen to provide about the same brilliance from both. When the motor is not running the supply voltage will of course fall to the car battery voltage. Under these conditions the second switch is placed in the HI position, shorting the diodes, providing full supply to the Ken unit and extinguishing the green LED.

FUSE

The cigarette lighter connection was originally acquired from a National cassette player. The rear section of the plug was removed and the front section secured to a suitable small box with Araldite. With this particular plug a fuse is incorporated, and is a worthwhile safeguard. By unscrewing the front section the fuse can be easily replaced. A 2A unit will be fine. The output lead for connection to the Ken is taken through the base of the box via a Neoprene shroud so the wire will be out of the way of the dashboard controls.

The diodes incorporated as droppers are also a polarity safeguard. This installation uses a negative ground system. Should the opposite apply it will be necessary to reverse the polarity of all the semi-conductors, and also to insulate the antenna from the car. With a small gutter grip quarter wave antenna connected, it's amazing what can be done with a couple of watts from a comfortable position in the car, either in motion or at rest. Happy mobileleering on two, fuffas. ■

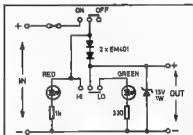


Figure 1



KP202 with adaptor

QSP

LANGUAGES

Bro. Cyril Quinlan of the Marist Brothers High School at Eastwood, N.S.W. under call sign VK2ACG has been the centre of a media snowball resulting from on air French, German and English language practice contacts with KKBKAA. From Zero Base, Mar. '73.

A PHASE MODULATOR FOR 2 METRES FM

I. Berwick VK3ALZ
107 Looyang Avenue, Glenroy 3046

There must be quite a few 2 Mx AM transmitters still about. These can be quite cheaply converted for 2 Mx FM. Many would run 50 watts or more and so provide quite a bit more power for base station use than the usual black box.

My unit has a QJEO6/40 in the final and uses 8 MHz FT243 crystals. These can be easily shifted up in frequency for a new channel by grinding with the appropriate grade of emery.

I use the following circuits (Figs. 1 and 2) for phone modulation of the oscillator as it is impossible to get sufficient deviation using frequency modulation with these crystals.

THEORY OF OPERATION

The collector-base function of Q₁ (Fig. 2) is reversed biased. The capacity of this function varies with the reverse bias.

The quiescent reverse bias is set by VR2. An audio signal superimposed on the quiescent bias causes the C-B capacitance to vary about its quiescent value. This varying capacitance swings the oscillator collector tank about resonance, therefore causing the collector current to alternatively lag and lead the collector voltage, i.e. the carrier wave at 18 MHz is phase modulated.

It can be shown that the deviation produced by phase modulation increases linearly with the modulating frequency — therefore to avoid excessive deviation at high audio frequencies, it is necessary to roll off the audio response above about

2.5 kHz — this is the function of IC-2 which is a single pole low pass active filter.

IC-1 is the audio gain stage.

If your transmitter uses type D crystals, frequency modulation can be used. The circuit I used for these crystals is shown in Figs. 3 and 4.

The quiescent value of C_J is fixed by the linearity requirement but we do not know what it is. Therefore we have to juggle C₁ and C₂ so that we have 18 MHz resonance for C_J.

Also we don't want to make C₂ too small, otherwise we won't be able to get enough swing of the tank. If C₂ is too large, we may tend to overdeviate at low audio gain settings.

These notes should be sufficient guide for the alignment procedure.

Initial resonance is done with PM in off position.

Linearity can be checked by monitoring in an FM receiver.

FOR THE INTERESTED

A very good text for deeper understanding of angle modulation systems is: K. R. Sturley, "Frequency Modulation".

In general, it can be shown that:

1. Above a given threshold FM gives a significant (up to 23 dB) improvement in SNR over conventional AM.
2. SNR increases with bandwidth for signals above threshold.
3. Below threshold SNR is inferior to other systems.

Therefore FM does not automatically become the ideal system for mobile use.

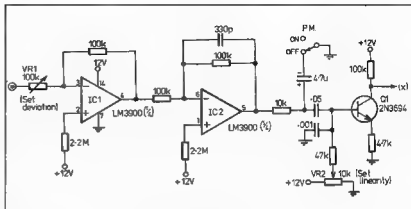


Fig. 2: Phase Modulator Circuit

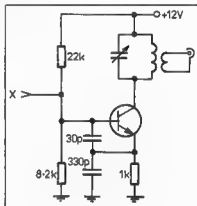


Fig. 3: Oscillator

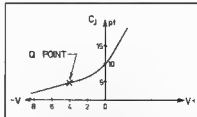


Fig. 5: Typical Junction Capacitance Vs Reverse Bias

For simplex mobile to mobile, or mobile to base, or for extended repeater paths, repeater DX etc., a better system would be SSB which has a 9 dB advantage over AM, but does not have a threshold problem.

I would like to see an SSB repeater for this type of operation

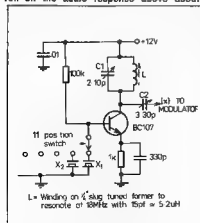


Fig. 1: Oscillator Circuit

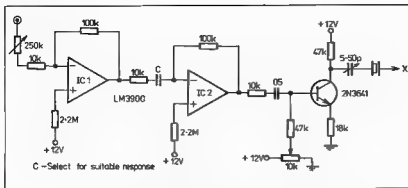


Fig. 4: Microphone Amplifier and Modulator

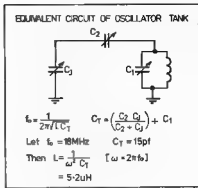


Fig. 6

TRY THIS

WITH THE TECHNICAL EDITORS

TWO-TUBE SSB PHASING RIG Or Get Your Friends' Feet Wet With 7 Watts!

The following article caused intense interest when published in AR, July 1961. As far as we know no-one has yet produced a solid state rig that is as simple — three active devices for 7 watts of SSB out. If you think that sounds like a challenge, you are correct.

Joe Boisvert W1HIE has come up with the end-of-all simplest sideband transmitters, this man, is the least! We have the SSB ARA's journal "The Sidebender" (Feb. 81) to thank for this information.

This little rig is clean cut and wrung out to the very minimum of parts that will put out a clean SSB signal. First off, the RF signal is fixed phased and so is the audio, but due to the fact that we are using a carbon mike with its limited audio band pass, it really works out fine for fixed phasing.

Measurements were made in actual operation and we came up with these figures.

- 1,200 cycles—30 dB suppression
- 2,500 cycles—20 dB suppression
- 500 cycles—15 dB suppression.

This may not be commercial SSB, but it sure beats the pants off DSB!

Construction of this unit requires no special parts and at that, the percentages are real loose. It is only necessary that the tuned circuits resonate at the operating frequency and that the audio coupling transformer have a 600 ohm output to the diode modulator. For this purpose I have used an ARCS Rx output transformer.

It is important that as little as possible of the xtal oscillator voltage get into the fields of the coils L2-3-4. Keep the oscillator coil L1 as far from the other coils as possible to avoid trouble in nulling out

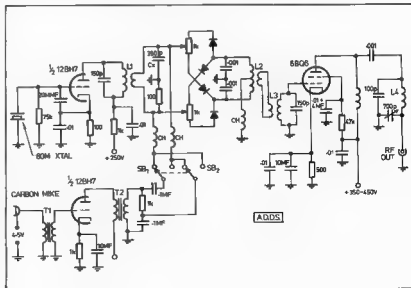
the balanced modulator. The diodes must be matched in pairs as to forward resistance. Don't think that by adding an extra audio tube and xtal mike that you will improve the rig. The secret of the quality is in the carbon mike and its limited band pass; and added band pass in the audio section will cause the fixed phasing to go too far out at both ends. If you want to build this rig for use on any of the other bands you can do so by making the tuned circuits resonant at the desired frequency but keep in mind that the RF phasing unit will have to be changed to present about 100 ohms to the balanced modulator and the link. This means that you will need only one half the capacity of Cx for twice the frequency.

Tuning up the rig is simple; unbalance one pot and tune all coil slugs for maximum output. Tune the out pie network L4, and output capacitor for maximum. Then adjust the balance pots for minimum output. You are now in business and ready

to be called a liar for it is not possible to build a phasing rig with only two tubes! Or is it?

PARTS LIST

- L1—35 turns No. 30 wire. Link, 12 turns No. 30 on cold end.
- L2—18 turns No. 28 wire. Link, 8 turns No. 30 to centre of coil.
- L3—35 turns No. 30 wire. Link, 6 turns No. 30 on cold end.
- L4—50 turns No. 28 wire on 1/4 inch coil form, slug tuned.
- Coils L1, L2 and L3 are wound on 1/4 inch coil forms, slug tuned.
- All capacitors marked "/M" are mica; all others can be ceramic.
- Cx—350 pF for 75 metres. One half capacity doubles frequency.
- T1—Carbon mike to grid transformer.
- T2—Plate to 800 ohms.
- Ch2 or 3 pi chokes (not critical).
- D1—1N38, 1N84 or most any diode; providing they are matched.
- R1, R2—1,000 ohms, carbon pots.



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Termination	25 pF	25 pF	25 pF	25 pF	25 pF	25 pF
Shape Factor	170 dB/2.4	170 dB/2.3	170 dB/2.2	170 dB/1.9	170 dB/2.0	140 dB/3.0
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AN ULTRA LOW-NOISE FET VIDICON AMPLIFIER

Andrew Pierson

1 Blindans Avenue, Salisbury Park, SA 5109

As indicated in the previous article describing a low-cost vidicon amplifier (*Amateur Radio*, September 1977), a more advanced version has been developed. In addition to ultra low-noise performance, this design offers facilities for line-by-line clamping, signal blanking, sync insertion and a 75 ohm line driver output stage.

The circuitry to be presented here is the complete video signal processing chain, from the target of the camera tube to the composite video output socket. It is shown in figures 1 and 2, where the vidicon amplifier itself extends from Q1 to Q6. Since the majority of general comments made about the first amplifier also apply to this design, I would recommend that the earlier article be read before proceeding with this text.

CIRCUIT DESCRIPTION — AMPLIFIER

The AC target load impedance is 50k ohms, and is made up of the target bias feed resistor and the gate earth return resistor (each 100k ohms) in parallel. In this circuit, a field effect transistor (Q1) in a common drain (i.e. source follower) configuration is used to obtain the necessary impedance transformation between the target load and the amplifier input stage. The input resistance of the FET is extremely high, and has almost no effect on the target load impedance, as determined by the two resistors previously mentioned. The input capacitance of the FET is very low, and this results in the total target shunt capacity being kept to an absolute minimum. The HF gain (i.e. compensation) requirements of the following amplifier stages can therefore be relaxed, with the result that noise at these frequencies is greatly reduced. The FET's own contribution to the noise spectrum is also less than that from a conventional transistor in the same circuit configuration.

Because the signal amplitude from the vidicon target is relatively low, it is permissible to self-bias Q1 by means of its IDSS current. Since this parameter may be anywhere between 2 and 20 mA, the variation in offset voltage developed across the source load resistor may be quite large. This potential may therefore be above or below the bias voltage at the base of Q2, so a 5 uF reversible polarity electrolytic capacitor has been fabricated from two 10 uF tantalum "TAG" types and

a 33k ohm resistor, as shown. Just in passing, it would be a very rare occurrence nowadays to come upon a new 2N3819 with an IDSS figure of 2 mA. Most new 2N3819s that I have tested measured around 8 to 10 mA, which is ideal for this application.

The "active" portion of the amplifier is Q2-Q6 inclusive, and all these stages are DC coupled to improve reliability and also to economise on coupling components. Operating point stability is assured by means of DC feedback, applied across all of the stages.

Q2 and Q3 form an NPN-PNP amplifier pair which produce a wide band voltage gain of 8.5 times. Q4 and Q5 form a further DC coupled amplifier pair, but frequency-sensitive networks are placed across their emitter resistors, so that the voltage gain of the amplifier increases smoothly with increasing frequency. Q4 is used to provide high frequency compensation, and also a small but variable portion of the low frequency compensation. The following stage (Q6) provides most of the low frequency lift.

Q4 has a minimum voltage gain of 4.7 times, but the high frequency compensation network (the 1 nF capacitor across the emitter resistor) causes the voltage gain to rise with increasing frequency at a rate drawing ever closer to 8 dB per octave (as the 100 ohm emitter resistor and low frequency network assume less importance), until the gain-bandwidth product limitation of Q4 (300 MHz) causes this lift to turn over and finally decrease. A low frequency compensation network also shares the emitter resistor of Q4, thereby causing a small portion of this characteristic to be applied simultaneously with the high frequency lift. The maximum additional low frequency compensation available (i.e. with the LF COMP potentiometer fully clockwise) can never exceed 6 dB, because the 100 ohm resistor in series with the network is equal to the emitter resistor of Q4.

Q5 has a minimum voltage gain of unity, but the low frequency compensation network (the 1 nF capacitor in series with a 100 ohm resistor placed across the emitter resistor) causes this figure to rise with increasing frequency, so that the loss due to the input circuit of the amplifier is almost cancelled out. The cancellation is made complete by adjusting the additional low frequency lift network associated with the emitter circuit of Q4.

It can be seen that the amplifier's gain Vs frequency characteristic is the sum

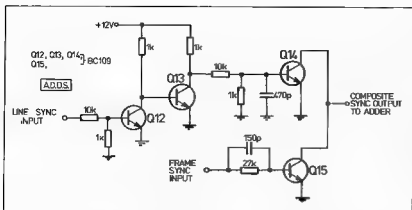
total of the effects of the three networks discussed. The low frequency compensation is variable over a limited range, and this should be adjusted for minimum smearing of objects in the reproduced picture. For more information on how this type of adjustment operates, the reader is referred to the earlier article. Also, please note that the compensation characteristics given are appropriate only, because loading effects on the preceding amplifier stage by the decreasing input impedance of the following stage have not been taken into account.

Q6 is a wide band amplifier with a voltage gain of approximately 3 times, and services to bring the output level up to the required 700 mV p-p under normal operating conditions. It also serves to invert the phase of the video waveform, so that white areas in the picture are positive-going. As mentioned before, DC feedback is applied over the stages Q2-Q6, and this loop provides a convenient means to adjust the amplifier's operating bias. The AMP BIAS potentiometer should be adjusted to produce a DC potential of 8V at point "A". Note that the feedback loop operates for DC and very low frequency AC signals only, as it is heavily decoupled. It has no effect on the video waveform, even at the frame frequency.

OPERATING PRINCIPLES — SIGNAL PROCESSING

Since the signal output from the camera tube target is AC coupled to the input of the amplifier (it would be extremely difficult and inconvenient to arrange DC coupling), the DC component of the video waveform is lost. Because sync pulses must be added to the blanking level in the video waveform, we must know exactly what voltage the black level corresponds to, in order to make arrangements for the sync pulses to extend 300 mV in a negative direction from this level. Fortunately, since the scanning beam in the camera tube is cut off during the line and frame blanking periods, the output from the amplifier during these times corresponds to true black in the picture. Because the line blanking periods occur regularly (every 64 uS) during the scanning process, it is possible to re-set the black level to any convenient potential with the aid of a line-by-line clamp, which is driven by line sync or blanking pulses from the camera's sync generator.

One may expect the output from a camera tube amplifier to be completely quiet during the line blanking periods, but this is hardly ever the case. They are often full of nasty transients etc and most of



CIRCUIT DESCRIPTION — COMPOSITE SYNC GENERATION

The circuit in figure 2 shows a simple method of generating a composite sync waveform from individual line and frame sync inputs. Since the processing circuitry requires a ground closure during sync periods, an "OR" gate has been formed by Q14 and Q15 with a common collector connection. If either transistor is turned "on", the output waveform is switched to sync level. Positive-going 12V pulses are required for both line and frame inputs.

The line sync pulse is applied to the base of Q12 via the 10k/1k resistive divider. Q13 is directly coupled to Q12, and serves to invert the line sync pulse so that it is again positive-going. This pulse is coupled to the base of Q14 via another 10k/1k resistive divider. Q14 is therefore saturated during the line sync intervals, thus operating the "OR" gate.

Now, Q12 and Q13 may seem superfluous, but this is not so. Their purpose (together with Q14) is to introduce a propagation delay of 1 μ s to the line sync pulse, so producing a line "front porch" in the assembled composite video waveform. This can be seen in figure 3. A portion of this delay is attributable to the normal propagation delays through Q12, Q13 and Q14. The remainder is produced by the two 10k/1n1k networks, which operate in the following manner. Sharp edged positive-going pulses are applied to the base-emitter junctions of Q12 and Q14 via 10k ohm resistors. These form integrator networks with the base-emitter capacitances, and so some time will elapse before the potentials across the base-emitter junctions reach their cut-in values, i.e. about 650 mV. In the case of Q14, additional capacitance has been added. This also serves to limit the rise and fall times of the added sync pulse to a realistic value.

When the positive-going pulses cease, the charge stored in the base-emitter junctions of Q12 and Q14 maintains these transistors in conduction until this charge is bled away via the 1k ohm resistors. The value of 1k ohm has been chosen to pro-

duce a total pulse "lengthening" of 1 μ s. So we see that the line sync pulse has had 1 μ s chopped off the beginning and 1 μ s added on to the end, i.e. it is still 5 μ s long, but delayed by 1 μ s. Incidentally, if you are supplying mixed syncs they may be passed through this network, since the 1 μ s delay is of little consequence to the frame sync pulse.

If it is to be added separately, the frame sync pulse is applied via the 27k ohm resistor and 150 pF "speed-up" capacitor to the base of Q15, which saturates during the frame sync intervals, thus operating the "OR" gate.

Figure 3 shows the output waveform at line rate produced by the clamping and sync insertion circuitry. Figure 4 shows the assembled line sync pulse in greater detail. The total current drawn from the



† 12V supply rail by the circuity in figures 1 and 2 will vary considerably with set-up adjustments and picture content, but it should be between 100 mA and 150 mA.

CONSTRUCTIONAL DETAIL

you are laying out a PCB, remember to keep the input stage well away from the output stages, and also make the earth tracks as wide as possible. Common Impedance earth paths are usually inevitable, and it is always advisable to keep their resistance and inductance to an absolute minimum. All resistors have dissipations of less than 1/4W, and the values specified are from the E12 series. They should be good quality 5 per cent tolerance cracked carbon or metal film types. The LF COMP, AMP BIAS and SYNC LEVEL potentiometers must have non-inductive (e.g. carbon) elements. The SET-UP potentiometer is not critical, but a carbon type will be the most economical. All capacitor values up to and including 100 nF should be polyester film "Greencaps", except the 100 nF rail bypasses, which are Hi-K ceramic types. The 10 μ F electrolytic capacitors are tantalum "TAG" types, and the 100 μ F and 1000 μ F values are conventional aluminium foil electrolytics. The transistors and FET specified may be by any manufacturer, provided that they meet the original specifications for these devices. This is very important, and substitute types should NOT be used. For general comments about the installation procedure, see the paragraph headed **INSTALLATION** in the previous article.

ADJUSTMENT PROCEDURE

1. Ground the gate of Q1, and measure the DC potential at the collector of Q6 (point "A") with a VTVM or multimeter. Adjust the AMP BIAS potentiometer to give 8.0V. Remove the ground from the gate of Q1.
2. Terminate the composite video output line with a 75 ohm load, and observe the output waveform with a CRO. Turn the SET-UP potentiometer fully clockwise. Now, back off the control VERY SLOWLY (its time constant is very long) until the lowest excursions of the video components are just beginning to be clipped off. Advance the control DEAD SLOW until the black areas in the picture are not crushed.
3. Adjust the SYNC LEVEL control to produce a sync pulse amplitude of 300 mV in the composite video waveform.
4. On a displayed picture, adjust the LF COMP potentiometer for minimum smearing. For more information, see the paragraph headed ADJUSTMENT PROCEDURE in the previous article.

SUMMARY

With the prototype amplifier, when using a one inch vidicon operating with a target voltage of +30V, an f1.4 25mm lens, and an ins.de scene under fluorescent illumination, the video component of the composite output waveform was 500 mV p-p.

NOISE

With a short-circuited input, the wide band noise as measured at point "A" was 3 mV

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AN AR SPECIAL: EQUIPMENT REVIEW — THE ICOM IC22S

The ICOM IC-22S is the latest in the ICOM 22 series to be marketed in this country by VICOM of Melbourne. The 22's have built up an enviable reputation in the two metre FM field over the years probably due to several very good reasons. Firstly they have been usually available from stock or at the worst on very short order. Secondly there has always been a good supply of crystals available for the various repeater and simplex channels, and last but not perhaps the most important, they have proved to be highly reliable in service. If, however, trouble did occur, VICOM always had the required spare parts and expertise to put things right.

The 22S is fully synthesized. That is, unlike its earlier relations, it does not require a set of crystals for each channel. In place of the crystal board is a diode matrix board with the capability of programming 22 channels. As supplied, it is set up for repeaters one to eight and simplex channels 40, 50 and 51. Appearance is almost identical to the earlier IC-22A. The colour has been changed from jet black to a dark charcoal grey and a duplex A, duplex B, simplex switch has been added.

The addition of the frequency synthesizer has added to the complexity of the unit to a marked degree. The original 22 had 23 transistors, 3 FETs, 3 ICs and 16 diodes, where the new 22S has 34 transistors, 7 FETs, 13 ICs and up to 128 diodes. Most of the additional components are required for the new frequency determining section.

Most of the general specifications for the 22S are the same as the earlier models, but it is interesting to see that the spurious output of the transmitter is now a specified item at -60 dB down on carrier level.

Even with all of the new circuitry the overall current drain from a 13.8 volt source is still the same at 2 amps on transmit and 400 mA on receive when squelched.

One new feature is the addition of a substantial heat sink at the rear for the final output transistor, another is some positive high SWR protection in the form of an SWR detector in the final output circuit and an amplifier to provide cut-off for an earlier stage.

The IC-22S sold here in Australia is set up so that channels can be programmed at 25 kHz intervals. However, other versions are produced in Japan to suit both the American and European channel spacing plans. The English version is known as the IC-240.

IC-22S CIRCUIT DESCRIPTION

In general the 22S is similar to the earlier models and readers are referred to the

review of the IC-22 in the December 1974 issue of *Amateur Radio*. Perhaps the most significant change in the receiver section is the new ceramic discriminator. This will provide better long term stability. The receiver RF stage is still a 3SK40 and the first mixer has been changed from a single gate FET over to the dual gate 3SK40. In practice no difference in performance was detected but cross modulation characteristics should be slightly better. The transmitter starts off at 10.7 MHz and this is mixed with the output of the synthesizer to produce the required output frequency. The same synthesizer frequency is fed to the receiver first mixer to produce the first receiver IF of 10.7 MHz. Diode switching is used throughout as with the earlier models, hence there is no audible click when changing from transmit to receive or vice versa.

THE 22S ON THE AIR

It took a little while to get used to the operation of the duplex/simplex switching. There is no indication of duplex operation other than the position of the switch. It is hard to understand why an LED indicator was not included to give a warning. However, once mastered operation became very simple and by using the facilities provided by this switch some unexpected operating features were found. When working on a repeater it is possible to switch to reverse so that transmit and received frequencies are changed over. This enables one to check other stations working into the repeater to see if simplex operation is possible. This also means that repeater channels not in use in the area

can be used for simplex contacts. Taking this one stage further, a repeater input frequency can be used for simplex operation without using the transmitter offset at all.

In all, it was difficult to pick the difference between the 22S and a 22A that happened to be in the shack at the time. Although the 22S uses a smaller loud speaker than the 22 or 22A, no difference could be detected in the received audio quality.

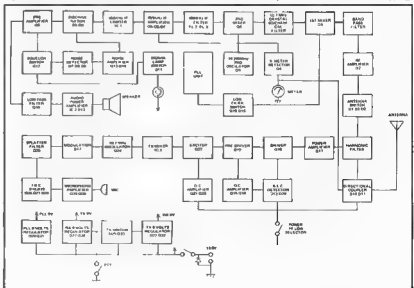
Full details are included on the method of programming additional channels and plenty of spare diodes are included with the transceiver. It appears that an accurate match is needed for the transmitter output. We found that if the SWR exceeded 2:1 when operating in the low power (1 watt) position that an audio howl appeared on the transmitted signal. It also seems that after some 22Ss have been operating for a long period of time, they are subject to a slight drift higher in frequency. Some units have been noted to shift up to 3 kHz. It should be noted that this only appears in isolated instances and this amount of shift is not serious.

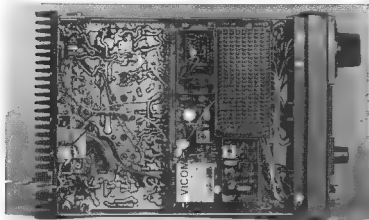
THE IC-22S ON TEST

A few quick checks were carried out to see if the unit was up to spec. It was. Transmitter output was measured on a Horwood power meter. It was 11.5 watts in the high power position and 0.75 watts in the low power position. On receive the mute opened at .2uV, an excellent figure.

INSTRUCTION MANUAL

The manual provides most of the informa-





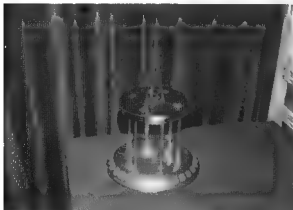
tion needed. The operation aspect is well covered and clear photos indicate most points that could require adjustment. A large scale circuit diagram is included which is a great improvement over the miniaturised version in the earlier books. Also new is a complete voltage chart for both transmit and receive conditions.

At the current list price of \$279.00, the 22S represents excellent value. Considering the channel capability it is actually cheaper than the model it supersedes and as sales have proved, it appears to be the way most amateurs want to go.

Our test unit was supplied by VICOM International, to whom all enquiries for the IC-22S should be directed. ■

The Versatile IC22S with cover removed showing programming board.
(Photo by Reg Goudge)

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Ian Hunt (left) VK5QX and David Wardlaw VK3ADW, present the RD Trophy to Ted Howell VK1DH.



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1.15 a.m. — RELAXATION!!

GOODWILL THROUGH INTERNATIONAL AMATEUR RADIO

Ian Hunt VK5QX

A recent visitor to Australia, Captain Tanongsuk Tuvinun of the Royal Thai Army, spent several months working with a Defence Establishment in Adelaide. Whilst not at this stage an amateur operator, but showing signs of becoming such, Captain Tuvinun, called Tanong for short, when back in Thailand has as one of his senior officers HS1JN Jumnon Sowanna, who is an Admiral in the Royal Thai Navy, and also a member of the Royal Thai Amateur Radio Society.

When Tanong arrived in Adelaide he found that he was working with Ian VK5QX and the amateur radio connection soon became known.

Needless to say, it was not too long before Ian had Tanong on the air talking back to Bangkok and several contacts were made with Kam HS1WR, who is the President of the Royal Thai ARS and a Colonel in the Thai Army. Contact was also made under these circumstances with Hans HS1BG, who is a Vice-President of the Society.

These links having been established and the bonds of friendship woven, it was thought by the Council of the South Aus-

tralian Division that some further gesture of friendship would be desirable and in order.

Tanong had told Ian VK5QX that reference books in Thailand were both difficult to obtain and quite expensive.

The VK5 Division Council decided to ask Tanong to take back to Thailand on behalf of the Division a set of books to be presented to the Royal Thai ARS.

These books were presented to Tanong by Ian VK5QX as Vice-President of the Division. As shown in the cover photograph, the presentation was witnessed by Bob Edgar VK5RS and Ron Catmur VK5FY, both of whom worked in the same area as Tanong and Ian.

The books presented comprised both Volumes 1 and 2 of the RSGB Handbook, the RSGB VHF/UHF Manual, the ARRL Antenna Handbook and an American handbook on VHF/UHF Antennas.

It is hoped that the provision of these books may in some small way contribute to the advancement of Amateur Radio in Thailand and serve as a useful reference for members of the Amateur Radio Society in that country.

Ian VK5QX.

COMMERCIAL KINKS

With Ron Fisher VK3OM
3 Fairview Avenue,
Glen Waverley 3160

The Realistic DX-160 was discussed in this column quite some time ago in general terms. A letter recently from Mr. A. Ward VK4WK suggested a few simple modifications for the receiver. It is claimed that they result in improved stability and better SSB resolution.

(1) To improve the ripple content of the built in AC power supply Break the lead from the output side of SW 11.2 to the 5 amp fuse. Now wire in a small low resistance LF choke. The secondary of an old speaker transformer is ideal, however the resistance should be no more than one ohm (suitable LT filter chokes are available). One end of the winding should go to the switch and one to the fuse holder. A small voltage will occur (.5 volt) but this did not affect performance. The modification resulted in improved SSB reception on 21 MHz and higher.

(2) The next modification was to isolate the BFO from the HF oscillator and provide it with its own stabilised supply. Disconnect SW 10:1 from the point where it connects to the positive point of Zener diode D7. Connect a 5.1 volt Zener across C48 to earth. Reconnect SW 10:1 to the 10.2 positive line via a 500 ohm 1/4 watt resistor. This modification provides better BFO regulation with improved SSB and CW resolution.

(3) This modification applies to the band spread system. Due to the design of the tuning system and the coupling between stages, the receiver goes slightly out of trim during the rotation of the band spread dial towards the high frequency end. The remedy is to connect a pecker capacitor in series. A value of about 16 times the maximum of the band spread capacitor is suggested.

Apparently quite a few of these sets come mislabeled on band "E". Check and make sure that yours isn't lined up on the image rather than the required signal.

Our thanks to VK4WK for his ideas. Next month a few simple modifications for the TS-520.

RATBAG CBERS ON RAMPAGE

Events of 29 April to 2 May at Greystanes

(From a deposition by VK2BPP and details from WIA N.S.W. Division)

Having been enjoying a pleasant Saturday out with family and friends, Bruce Pinkerton VK2BPP returned home about 23.30 hours to be met by his next door neighbour with the advice to get the family into the house quickly to avoid trouble. A group of CBers had left a petition under Bruce's front door about 20.30 hours.

Earlier in the evening, the neighbour said, he had been confronted by two groups of CBers, some 35 to 40 in number. The last confrontation was shortly after 20.00 hours, when he had been threatened. They made a demand to know VK2BPP's whereabouts and to pass on the message that if a device jamming their channel was not switched off in an hour they would damage VK2BPP's aerial installations. The neighbour also said that members of the group had been in the back yard and on the roof and he had tried to disperse them.

VK2BPP, having obtained a torch, then saw the damage done to his Oscar satellite tracking, VHF/UHF and HF aerial systems, the coax and control cables cut and whole sections removed. It was then that a group of CBers began forming in his driveway, some apparently drunk. Upon sighting them Bruce asked why, and who was responsible for the damage. Observing aggressiveness, he telephoned the police who arrived about 23.45 hours and the group dispersed. He then found all his house fuses had been removed and both his and his neighbour's gardens severely trampled. Telephone harassment then began.

Another group of CBers arrived about 00.30 hours and around 04.15 hours empty cans were thrown into the garden and at the house. At one stage there were over 80 cars in the street.

On Sunday, Bruce was visited by a friend to whom he had been giving help towards his AOCIP instruction. The friend told him that the jamming device operated a "beep-beep" signal on 27.155 MHz from dusk to dawn using light switches out of DMR roadworks warning lanterns. Other similar devices had been previously located in the area and discovered by two CBers. A listening post was then set up and logged the commencement of the interference at 17.15 hours. From 18.00 hours CBers began driving up and down the street but when the police arrived a little later they had all gone. At 20.45 hours a party of two CBers and three nearby amateurs went off on foot to search for the device which, it is understood, was found in a tree some 250 metres away.

Another threatening telephone call came in at 01.00 hours on Tuesday morning and it was later that the loss of his 2 metre mobile whip was discovered.



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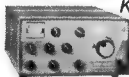


hy-gain ANTENNAS



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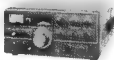
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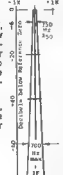
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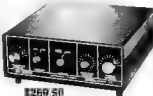
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Dentron Radio has packed all the features a linear amplifier should have into their new MLA-2500. Any Ham who works it can tell, you the MLA-2500 really was built to make amateur radio more fun.

DENTRON ANTENNAS:

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- SKYCLAW — TUNEABLE MONO BAND 160-40m
- EX-1 IDEAL VERTICAL FOR PHASING

- WRITE OR CALL FOR SPECIFICATIONS
- CHECK OUR MOST SENSIBLE PRICES.

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Call it what you will — antenna tuner, transmatch, match-box, or matching network, the JR. MONITOR has it all wrapped up in one neat 5 1/2" w x 2 1/2" in h x 6 1/2" in d metal cabinet. Think of the unlimited possibilities you'll have for experimenting with dozens of antennas. For instance, the Dentron All Band Doubler fed with balanced feed line hooked to the JR. MONITOR covers 1.8-30 MHz — or try this mobile suggestion: 108 is mobile who fed with coax to the JR. MONITOR located under the dash will give you 16-40 metre mobile coverage and no coils to change! Order Today.



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With the Robot 400 you just plug it into your transceiver, connect a TV monitor or your home set with the optional Robot RF adapter kit, tune to 14 230, and you're operating SSTV.

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New Model 75 RTTY TO VIDEO CONVERTER

Features:
4 speeds (60, 66, 75, 100 wpm)
Built-in T.U. with 3 shifts (170, 425, 850 Hz)
32 character x 16 line video output with scrolling
Connects directly to receiver audio & video monitor



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New Model 150 RTTY KEYBOARD

Features:
4 speeds (60, 66, 75, 100 wpm)
Built-in AFSK with 3 shifts (170, 425, 850 Hz)
Automatic CR & LF at end of 64 or 72 character line
Built-in low shift CW ID provision

CUSHCRAFT ATB-34
10, 15, 20 meter antenna.
Price: 289.00



ANNOUNCING NEW INFO-TECH MODEL 200!

A complete system that converts Morse, RTTY and ASCII to Video, using Fairchild F-8 Microprocessor Technology! A good receiver and video monitor are all that is required!

NEW Model DX-555 Counter-Generator

Generator:
440 kHz to 30 MHz in 3 ranges
Output displayed on counter and available at rack on rear panel 600 Hz modulation for AM receivers.

Counter:
5 digit display, 7 digit readout capability 10 Hz to over 30 MHz (250 MHz with prescaler). Input level 20m Vrms to 5 V rms (Prescaler 200m Vrms to 2 Vrms). Base oscillator beats directly against WWV

NEW COUNTER-GENERATOR
Two vital pieces of test equipment in one



A Unique New SSB/CW Transceiver For Amateur Communications, at \$1990

There is no substitute for quality, performance, or the satisfaction of owning the very best. Hence, the incomparable National RJX-1011 amateur transceiver. The RJX-1011 covers all amateur bands 1.8-30 MHz (160-10 metres). It utilizes advanced Phase-Lock-Loop circuitry with dual gate MOS FETs at all critical RF amplifier and mixer stages. There's a rotating dial for easy band-scanning and an electronic frequency counter with digital readout and a memory display that remembers frequencies at the flip of a switch. And that's just the beginning. Matching speaker unit RJX-S1011 and complete external VFO RJX-V1011 also available.

For further information and specifications write, phone or call in!

LINEAR AMPLIFIERS

SCS: HF3-100L2, 3-30 MHz bi-linear amplifier \$245.00.
SCS: 2M10-80L2, 144-148 MHz, FM/SSB linear amplifier, \$259.
METRON: MA1000, all solid state, 1 kW amateur band linear amplifier — lightweight, compact and rugged
YAESU MUSEN: FL-2100B, 80-10m linear amplifier

ANTENNAS:

HUSTLER: 4-BTV — vertical trap antenna, with 80m resonator, \$130.00.
HUSTLER: Mobile vertical trap antenna (80-10m) P.O.A.
CUSHCRAFT: ATB-34, 4 element beam 10-15-20m \$289.00.
WILSON'S SYSTEM ONE: TRIBAND ANTENNA — A DXer's delight, operating 20 m on a full 26 ft boom with 4 elements on 20-15, and 5 elements on 10. Gain 10 dBi \$339.00.

RF PREAMPLIFIERS FOR 3-30 MHz BAND:

Model SX-59 for use with transceivers.

SPECIFICATIONS.

Frequency range 3-30 MHz in 3 bands:

3-7, 7-14, 14-30 MHz

Gain 21dB nom (at 7 MHz), front

panel variable control

Attenuator — 20 dB attenuation sel-

ectable from front panel control.

Imped. 50 or 70 ohm systems, UHF connectors on rear panel.

Switching requirements* requires external relay contact

switching when used with transceivers. Remote contacts

readily available from most amateur HF transceivers, including

TS-510, TS-511, TS-520, TS-820, FT-101, FT-401, FT-200

and FT-201



\$84.00

AMATEUR BAND TRANSCEIVERS:

NEW — NATIONAL: RJX1011 — Unique SSB/CW 160-10m transceiver with digital readout and matching speaker and external VFO

TRIO KENWOOD: TS520S — SSB/CW, 160-10 metres, with optional digital readout.

TRIO KENWOOD: TS820S, 160-10 metres digital readout

TRIO KENWOOD: TS820, 160-10 metres.

TRIO KENWOOD: TS700A — 144-148 MHz all mode transceiver

TRIO KENWOOD: TS600A — 50-54 MHz all mode transceiver.

TRIO KENWOOD: TR-7400A — 144-148 MHz FM transceiver.

YAESU MUSEN: FT101E — 160-10 metres, AM, SSB, CW transceiver

YAESU MUSEN: FT301 series, 160-10m AM, SSB, CW transceiver.

RECEIVERS:



DRAKE: SSR-1 Wadley Loop receiver

TRIO KENWOOD: R300 general coverage BCL receiver

YAESU MUSEN: FRG-7 general coverage Rx, Wadley Loop System

NATIONAL: DR48 (RF4800) — general coverage, digital dial, communications and BCL receiver.

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WOOMERA AMATEUR RADIO CLUB — FIELD DAY ACTIVITY

ABOUT THE CLUB

Of the eight club members licensed, three are Americans. The club (possibly the only one in Australia) has an operating roster, i.e. one week in eight you can operate from

your home. The club equipment can be used any time.

The club has recently purchased equipment to operate Mode "A" through the

Oscar satellites

We were given a 50 per cent subsidy by the Woomera Board (equivalent of Local Government).



John Nankervis VK5OJ and wife Carol, replenishing refreshments(?)



Dick Menz VK5OL and YL Gabrielle Chlebeck of Andrew VK5ZWO.

WARC '79 FUND RAISING BY ILLAWARRA ARS

The Illawarra Amateur Radio Society of Woomera, N.S.W., during the latter part of 1977, took up the challenge to raise funds towards the WIA participation in WARC '79.

A raffle was conducted and the net proceeds amounted to \$400.

Picture shows Tim Mills (left) VK2ZTM, President of the N.S.W. Division of the WIA, receiving a cheque for \$400 from Brian Boseley VK2BCI, Secretary of the

Illawarra Amateur Radio Society, at the Society's monthly meeting for April 1978.

On accepting the cheque, Tim thanked the members of IARS for their initiative, and in particular thanks to John Hodgkinson VK2BHO, who conducted the raffle.

Tim, in an address to the meeting, spoke of the importance of WARC '79 to all amateurs and also the role that the WIA plays in serving the interests of amateurs generally.

(Information from Ian Bowmaker VK2ZJA.)

QSP

**MARS
MALTESE AMATEUR RADIO INTERNATIONAL
SOCIETY**

The MARS is a society of members whose interests are radio experiments and communications. It is world wide.

The headquarters of the society is in Canada, and its Director is George MUSCAT (VE6GNN). There is a branch of the society in Australia, and the Director is Paul Muscat (VK5PO), located in South Australia.

To be a member of the society you have to be of Maltese origin or married to a Maltese person. You also have to be a licensed amateur radio operator of any class.

For further information please contact one of the following members:—

Len Pearson (VK2NNU), 7 Damien Avenue, Wentworthville, NSW 2145; Sam Galea (VK2NOG), 57 Fairford Road, Casley Vale, NSW 2108.

WE DO OUR BEST!

Switchboard Op: "Good morning. Can I help you?"
Voices: "Yes please. I am inquiring about xemer diodes."

Switchboard Op. (after pause): "I'm sorry, Sir, but Mr. Diodes doesn't work here any more."

G2NM

The call sign G2NM, which belonged to the late Gerald Marouse, is very well known to old-timers. News from the Chichester and Cairns ARD is that G2NM has been issued as a commemorative call for use on 24th-25th June to enable old-timers to repeat contacts made by the late G2NM.

CONTESTS

Kevin Phillips, VK3AUQ
Box 97, East Melbourne, 3002

RD CONTEST 1978 — RULES

The Remembrance Day Contest Rules for the 1978 Contest will be published in the July issue of AR. The contest will be held on Saturday 12th and Sunday 13th of August.

MONTHLY VALENTINES

May 27-June 4 Townsville Pacific Festival Contest

June
2/5 CQ/PHC/HTH QSO Party
17/18 West Virgin QSO Party
17/18 All Asian Phone
18 WAB LF CW Contest

July
1/2 Venezuelan Phone Contest
8/9 Radiosport Competition
15/16 Tan-Tan Nat QSO Party
15/16 Sunshine State—ack Files Memorial (VKA only)
22/24 Rhode Island QSO Party
29/30 Venezuela CW Contest
29/31 Country Hunters CW Contest

August
12/13 REMEMBRANCE DAY CONTEST 1978
19/20 SARTG RTTY Contest
26/27 All Asian CW Contest

September
18/17 Scand navian Activity Contest CW
23/24 Scand navian Activity Contest Phone

October
28/29 CQ WW Phone Contest

November
25-26 CQ WW DX CW Contest



QSP

YL INT'L SSBERS CONTEST

1978 annual QSO party [contest], CW only 19th May 1800-2400Z, CW and Phone 20th May 0200-1200Z to 23-5959Z, on 21st May, one 6-hour rest period per 24 hours of contest period [note in log], all bands. Suggested frequencies: CW 3565, 7070, 14070, 21070, 28070 kHz, Phone 3625 (VK 3660) 7260 14333, 21373, 28673 kHz. Further details from VK2, G or VK3XB.

NEW PREFIX

A test signing 8J3ITU will be operative during the 14th Plenary of the CGIR to be held in Kyoto from 7th to 23rd June.

AMATEUR SATELLITES

Bob Arnold

VK3ZBB

There are three ways in which information can be obtained to ascertain the location of satellites and their time of acquisition and loss at various locations within Australia.

1. Reference can be made to the equator crossing predictions which appear in these columns. Used in conjunction with the "Standard Orbital" published in "Amateur Radio", October 1972. These standard orbits are for OSCAR 6 but are applicable to OSCAR 7, and in due course a similar set of figures will be presented for OSCAR 8. It is not desirable to produce the figures for OSCAR 6 until the orbit has settled down to a defined pattern.

2. On behalf of AMSAT, Skp Reymann WEPJA, PO Box 374, San Dimas, California, USA 91773, has produced calendars containing all orbits for each satellite. These orbital calendars are most useful but it is necessary to do a certain amount of calculation to determine the time of acquisition and loss at any particular location. Please note the two calendars are each available for \$US5.00 to AMSAT members and free on request to local AMSAT groups.

3. Harry Bates VK4XQ, of Gold Coast Computer Services, PO Box 206, Surfers Paradise 4217, has set up a service for OSCARS 7 and 8 based on the precise location of an individual QTH. This service provides all accessible orbits for each day, giving time of acquisition and time of loss. For each orbit reference is made to a series of charts giving the following information on—

- (a) The particular reference number.
- (b) The equatorial crossing of the ascending node orbit and that will produce these figures.
- (c) The time in minutes after equatorial crossing when the satellite will first be heard.
- (d) For each minute in the pass, azimuth and elevation to the satellite.
- (e) The time of loss.

Harry will supply this service for either satellite at a fee of \$20 for the charts and the first six months orbit predictions. There is \$10 for each subsequent six months. For each set of charts include \$1.00 for postage. A proportion of these charges will be donated for future satellite development. All Harry requires to provide this service is the latitude and longitude of your QTH.

OSCAR 8

The month of April saw a stabilisation of OSCAR 8 and the parameters given in the attached table are reasonably reliable for the calculation of orbits data. However, no one has yet come up with information to enable accurate tracking to be calculated and the azimuth and elevation positions for each visible pass are still guess-work, and from the limited number of reports received this lack of data is causing some troubles.

Mode A operation is scheduled for Monday through Friday (GMT) with Mode J activated on Saturdays and Sundays. Results on Mode A are superior to those obtained through OSCAR 7 and many contacts can be heard. At this point, we still suffer from a fall away in signal strength as the satellite proceeds to the north—as with AO7

this is probably due to the antenna of the satellite being in shadow relative to the ground station.

Reports of activity on Mode J are widely variable with few stations making good QSOs. Col VK8HI reports excellent results as do the Japanese operators. The lack of activity on this Mode is probably due to several factors (i) Antenna systems designed for the correct polarisation on 435 MHz, (ii) Convertors with adequate sensitivity, (iii) Break-through of 146 MHz harmonics on 435 MHz. Careful attention to these factors should improve results and increase activity on this Mode.

OSCAR 7

This satellite continues to operate well on Mode B with fair results on Mode A. Mode switching has been less apparent of late and the predicted Modes are now more reliable. The last few days of April have seen excessive noise on Mode B and distortion of audio which has made some QSOs quite impossible. This difficulty has been noticed before and it has corrected itself; let's hope it will do so again.

ACTIVITY

Several stations which were active in OSCAR 8 days have returned to AO8, maybe other "old-timers" will also be heard again.

At the request of a number of amateurs I am publishing a list of VK stations heard during the past two years—some are still very active, some spasmic and others are not heard at all these days.

- VK1—VP, BH, WP, PT, PG.
- VK2—PU, AOC, ZN, ALU, AYC, AGC, BAE, AWW, RB, BQJ, BVJR, ZI, AHE, ZTA, ZSL, ZFX, ZXL, ZAZ, ZAA.
- VK3—BFC, AMN, WM, AUO, AOC, BER, AGR, ADR, ACH, AGL, BH, AWW, ZUR, ZDW, ZPA, ZBS, YJ, YFT, YIL.
- VK4—LO, XO, XZ, RY, TL, ZDA, ZIL, ZDE, ZMC, ZRF, ZRO, ZBS.
- VK5—NY, OR, GU, MT, WQ, EU, HI, GW, LZ, SV, ZPS, ZIV, ZIM, ZAU, ZOG.
- VK6—WQ, KJ, HK, XZ, GU, LM, ZFY, ZED, ZPO, ZCG, ZKO, ZSO, ZMIA.
- VK7—LZ, AZ, JZ, ZAH, ZAK.

CONTINUITY

As I shall be away for the next couple of months, Charlie Robinson VK3ACR will be your scribe. Thanks, Charlie, I am sure you will have some interesting notes, particularly through your contact with the AMSAT Pacific Net.

For those who may have requested OSCAR information, my apologies for the delay—I will reply as soon as possible.

OSCAR 7

JULY 1978

Date	Orbit	Mode	Time Z	Loss	*W
1	16579	B	0134	81.8	
2	16581	A	0034	98.4	
3	16584	B	0128	80.0	

SATELLITE PARAMETERS

Launch Date	OSCAR 7 15 Nov. 74	OSCAR 8 5 Mar. 78	R-8 During 1978 Four Satellites	OSCAR Phase 3 Est. Dec. 79	F76/8
Inclination Degrees	101.7010	98.99	82	57	99.855
Orbit Period Minutes	114.94478	103.21912	102	11 hr approx.	103.729
Orbit Increment Degrees	26.736206	25.80687			26.49
Apogee km	1481	830	950	24249	1025.968
Perigee km	1450	810		932	
MODE A	UP 145.85-145.85 RC 29.40-29.50	OSCAR 8 145.85-145.85 RC 29.40-29.50	Russian Series 145.80-145.90	OSCAR Phase 3	F76/8
MODE B	UP 432.125-432.175 LC DN 145.825-145.875 Inverted LC	OSCAR 8 145.80-146.00 LC DN 435.10-435.290 Inverted LC	435.150-435.290	145.850-145.900 Inverted 145.850-145.900	435.970 AD Modulated No commun. action
MODE J	UP 145.80-146.00 LC DN 435.10-435.290 Inverted LC	145.80-146.00 LC DN 435.10-435.290 Inverted LC	435.150-435.290	145.850-145.900 Inverted 145.850-145.900	435.970 AD Modulated No commun. action
BEACONS	A 29.602 B 43.160 B 145.972 LC 2304.1 LC	LC 29.402 LC 435.095 LC			
Polarisation for Southern Hemisphere LC — Left hand Circular RC — Right hand Circular					

4	16616	B	0027	64.9
5	16628	A	0121	75.5
6	16641	B	0021	63.3
7	16654	B	0115	75.9
8	16666	A	0014	61.7
9	16679	B	0109	75.3
10	16691	B	0008	60.2
11	16704	A	0102	73.8
12	16716	B	0302	58.6
13	16729	B	0056	72.2
14	16742	A	0150	85.8
15	16754	B	0050	70.8
16	16767	B	0144	84.2
17	16779	A	0043	69.1
18	16792	B	0138	82.7
19	16804	A	0037	67.5
20	16817	B	0131	81.1
21	16829	B	0030	66.0
22	16842	B	0125	79.5
23	16854	A	0024	64.4
24	16867	B	0118	78.0
25	16879	B	0018	62.8
26	16892	A	0112	76.4
27	16904	B	0011	61.3
28	16917	B	0106	74.8
29	16929	A	0005	59.1
30	16942	B	0009	73.3
31	16955	B	0154	88.9

OSCAR 8

JUNE 1978

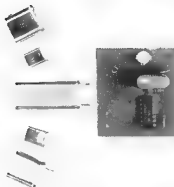
Date	Orbit	*W	Time Long.
1	1216	0048	51
2	1232	0053	53
3	1248	0058	54
4	1260	0104	56
5	1274	0109	57
6	1288	0114	58
7	1302	0118	59
8	1316	0125	61
9	1330	0130	62
10	1344	0136	63
11	1358	0141	65
12	1371	0002	40
13	1385	0008	41
14	1399	0013	43
15	1413	0018	44
16	1427	0023	46
17	1441	0028	47
18	1455	0034	48
19	1469	0039	49
20	1483	0044	51
21	1497	0050	52
22	1511	0055	53
23	1525	0100	55
24	1539	0105	58
25	1553	0111	57
26	1567	0116	59
27	1581	0121	60
28	1595	0126	61
29	1609	0132	63
30	1623	0137	64
31	1637	0142	65
2	1650	0004	41
3	1664	0008	42
4	1678	0014	43
5	1692	0020	45
6	1708	0025	46
7	1720	0030	47
8	1734	0038	49
9	1748	0041	50
10	1762	0048	51
11	1778	0051	52
12	1790	0054	54
13	1804	0102	55
14	1818	0107	58
15	1832	0112	58
16	1846	0117	59
17	1860	0123	60
18	1874	0126	62
19	1888	0132	63
20	1902	0138	64
21	1916	0000	40
22	1929	0006	41
23	1943	0011	42
24	1957	0016	44
25	1971	0021	45
26	1985	0026	46
27	1999	0032	46
28	2013	0037	49
29	2027	0042	50
30	2041	0047	52
31	2055	0053	53

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TEN-TEC



SPECIFICATIONS

GENERAL

Frequency bands: 3.5-4.0, 7.0-7.5, 14.0-14.5, 21.0-21.5, 28.0-28.5, 28.5-29.0, 29.0-29.5, 29.5-30.0 MHz. Ten meter crystals furnished for 28.0-29.0 MHz. All circuits permeability tuned. Tuning vernier 25 kHz per revolution, typical. 8 MHz 1:1 filter, 8 pole crystal lattice. Direct frequency readout [Model 540 — slide rule, color coded dial indicates 100 kHz segment, dial shift increment to 1 kHz. Accuracy ± 1 kHz from nearest 25 kHz calibration point. 25 kHz pulsed calibrator. Model 544 — six digit, 0.43" high LED numerals. Least significant digit indicating 100 Hz green, all others red. Accuracy ± 100 Hz. No calibrator in this model.] Automatic sideband selection, reversible. VFO frequency stability. Less than 15 Hz change per $^{\circ}\text{F}$, averaged over a 40° change from 70° to 110° , after 30 minute warmup. Less than 10 Hz change from 200 to 240 VAC line voltage when using TEN-TEC power supply. Power required [Model 540 — 12-14 VDC. 500 mA receive, 18 A maximum transmit. Model 544 — 12-14 VDC, 1 A receive. 18.5 A maximum transmit.] Modular construction [Model 540 — 10 plug-in assemblies and 7 fixed circuit boards. Model 544 — 10 plug-in assemblies and 9 fixed circuit boards.] Semiconductors: [Model 540 — 47 transistors, 33 diodes, 11 ICs. Model 544 — 65 transistors, 38 diodes, 14 ICs, 1 LSI, 6 LED displays.] Power switch remotely controls

power supply. Snap-up front feet. Construction. Rigid aluminum chassis, sub-panels, top and bottom. Cycloplastic side panels. Finish. Etched aluminum panel textured black top and sides. Size $4\frac{1}{2} \times 13\frac{1}{4} \times 13$ ". Net weight 12 lbs.

RECEIVER

Mosfet rf amplifier. Preset resonator control. 0.3 uV for 10 dB S+N/N. 2.6 kHz band width, 1.8 shape factor at 6/80 dB points. AGC controlled by rf gain control. Meter automatically switched to "S" meter when receiving. Offset tuning with defeat switch and LED indicator. Built-in speaker in bottom. External speaker/phone jack. Less than 2% audio distortion. WWV reception at 10 and 15 MHz. CW filter (optional), 150 Hz wide, two positions, shape factor 7:2 @ 6/80 dB.

TRANSMITTER

200 watts input, ssb and cw 100% duty cycle. Instant band change, no tune-up required. 8 pole ssb filter. Automatic Level Control on front panel. LED indicator shows operation in ALC region. CW sidetone fed into audio amplifier when in CW mode. Sidetone adjustable for tone and volume. Automatic CW offset of 750 Hz. Press-to-talk. Meter indicates SWR when transmitting. High impedance microphone input. RF output impedance 50-75 ohms, unbalanced.



PLEASE PHONE, CALL OR WRITE, FOR FURTHER PARTICULARS OF THE TEN-TEC RANGE

LETTERS TO THE EDITOR

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the publishers.

February 9th, 1978.

The Editor,

Dear Sir,
After finally getting on the air again I was pleased to find activity on 160 metres over the 28/29 January week-end and heard between 0830-1400 MDT were K0RF, K5MA, W6YJ, K7NN, K6SE, N6OX, K480C, ZL1MG VK3JM, VK6HD, VK5KO, VK4XA, VK47, and dozens of IAs. My aerial was an 80m in-verse to a Codan antenna tuner. Six metres had a few openings where I was at home.

14-12-77 = 0845 to 0900 GMT = VK6ZGJ, VKVUV.

7-1-78 = 1015 to 1115 GMT = VK4E DO, ZTV, GM, ZWB, DV in Rockhampton area VK4s ZBC, ZBW, PL in Brisbane area and VK2ZDY.

15-1-78 = 0100 to 0115 GMT = VK4ZBC, ZEC in Brisbane area.

20-1-78 = 0600 to 1100 GMT = VK2s ZNS, ZPP, ZAY, ZIO, H0, ZVL, VK4s ZIL, ZWH, LE and VK1RK.

29-1-78 = 0500 to 0530 GMT = Aalen language 558 on 48 880 MHz. Signal peaked at beam heading of NW at 5 x 5.

I wish to pass my best wishes to all past and friends and wish to let them know that I'm back on the air from Clifton Beach (20 km north of Calma) on all bands 160-2m using a TS500S/TV500/JC225 using various aere.

Previous calls K8CAA K5C0U, KH8GLU, K0X8K, VK3ND VK4ABA, V6SAA, VR3DY VR8DY, 5W1AF, and operator at V6SAB, still have logs and QSLs from most operations and anyone who worked me under any of those calls can all get a QSL.

Ed DeYoung VK4XJ, Box 2056, Calma.

7/4/78.

The Editor,

Dear Sir,
Instead of the "DK and You" column why don't you rename it DK and ME. The person you picked to write that column has about as much appeal as a Sunday 'sexie'.

He has used the column as a soap box to expound his own inability to relate to the wonderful hobby of Amateur Radio. I can imagine a new licensee reading that in an effort to find out how the experts get to work the rare DX countries, and heading straight back to stamp collecting. Sir, you do the hobby a disservice by allowing said gentleman to rave on about the virtues of rag chewing and chewing the fat with a mate in Kilowatt Alay California, on 20 metres.

I find myself wondering what would have happened when I was logged in by the Clipperton Operator had I commenced yarning on about my ignorance to my wife's great tomato relish and the new beaut box I just bought for \$1,000 which enables me to work Jop on Channel 40 FM.

OK, we are all entitled to our personal opinions about our hobby but am sick and tired of hearing of people such as the author of your DX column use the airwaves to ram home the point that they aren't turned on by that sort of thing.

I am offended by his attitude and think that the column DK and YOU is just what it says. An introduction to where it's at and how to get that rare station. This could be of great use to a newcomer.

His attitude to QSLing confirms what I have often suspected of some Australian Amateurs, especially from Norfolk and Hundreds of dollars in IRC coupons and mail have been spent by overseas Amateurs in pursuit of various awards for achievement in DX Commercial as it may seem, it is the only way to get some congratulations of countries, especially rare ones. Our friend here seems to be one of those who waste paper baskets overflowing with cards which some unfortunate

have sent to him. I can imagine the frustration of the Amateur who had the misfortune to get him a "First VK OM" waiting five years for that card which will never return.

Even the formality of writing CFM and signing it on the back of the DX station's card would be a little better than the Incinerator.

I realise you need space for other contributors so I'll conclude in a fairly famous statement.

"The final courtesy of a QSO is a QSL."

There are no time limits on QSOs or in fact what constitutes a QSO. I hope I never meet the author on a six metre TEP opening where there is maybe two or three minutes to exchange necessary QSL information.

Your column insists on using the space to expound the virtues of the author may I suggest you scrap it again or use it for some other good cause.

Yours faithfully,

Stephen R. Gregory VK3OT.

56 Coleman Street,
Wagga Wagga 2650.

The Editor,

6th April, 1978.

Dear Sir,

I noted with interest that the Department of Posts and Telecommunications has granted combined CB and Novice Licences for \$25 — no doubt as a minimal form of compensation to the Amateur Service for the "rape of 11 metres".

I point out that there are some FULL AOCGP and "2m" call amateur operators who are engaged in training and encouraging CBers to up-grade to Novice — and higher qualifications, who, in order to perform this function, pay the \$12 for their amateur "tickets" and \$25 for the privilege of talking to CBers in order to spread the good news of amateur radio. There are not very many of us in this area and, I suggest, it would not be unreasonable to suggest that a similar "Combined CB and Full Licence" fee should be made available at least on the same terms as for the Novices. While we may not be making much of an impact on the horde of CBers (licensed and unlicensed) who now occupy the 11 metre band, at least we ARE making an effort that will incidentally reduce the problems facing by unqualified, non-technical users on the 27 MHz area. To that extent, the Minister for Posts and Telecommunications could quite reasonably grant this concession. Accordingly, I request that this matter be given publicity by your valuable journal.

Yours faithfully,

Rex Black VK2YA.

The WIA executive has this matter in hand and a report will be made in due course through WIA NEWS — Ed.

Box 1513, G.P.O.,
Brisbane 4001,
16th March, 1978.

The Editor,

Dear Sir,
It's amazing! A retailer's advertising appears in AR (March, p. 35) announcing 5 element 11 metre beams!

What, buy one now, and be prepared for 1982 when the band reverts to the Amateur Service? or maybe the intended market is elsewhere (along with the featured PL-119 Ihears), notwithstanding that legislation forbids the use of high-gain antennas on 11 metres.

Yours faithfully,

Mervyn Emsom VK4SO.

3rd March, 1978.

The Secretary,

The Wireless Institute of Australia,

Dear Sir,

It gave me very great pleasure last week to receive your letter informing me of the award to me of the Alan Shawsmit Journalistic Award. Our hobby of Amateur Radio is one in which awards are much sought after, but always with the thought in mind that we may be lucky enough to top the score in the next contest, or to finally gain that one hundredth QSL for the DXCC. The thought that any of us can gain the distinction of a Journalistic Award had certainly never come to

my mind, making the receipt of the plaque (and this cheque) a complete and very pleasant surprise.

Would you please convey my sincere thanks to the Publications Committee and to Alan Shawsmit for selecting my contribution for the award. Without the happening of the Social Ambrosia and "That Field Station" there would not have been an article to write, so I must also say thanks to the large team who made the whole effort a success. In particular I should mention to Bill Ross VK3ZIM, whose photographs contributed so much to the success of the article.

Yours sincerely

Max Dawkins VK3TR

The Editor

Dear Sir,

I would like to make a suggestion for a new Australian Award, currently there are very few certificates available to VK stations for any form of achievement within their own country. As a former Federal Awards Manager of the WIA, I am well aware of the interest shown in awards by VK stations and also the importance they place in helping to maintain activity on the bands. Those who were active during the period of the Cook Award in 1970 will undoubtedly remember the boost that gave to local activity. At the present time our very bands are under considerable pressure from many amateurs the more activity that can be promoted the better.

For many years the WAWKGA (Worked All VK Call Areas Award) has enjoyed enormous popularity with overseas stations and remains virtually the only award issued by the WIA to overseas stations. For a DX station to achieve this award takes a very considerable effort and many operators often make comments to me that they are trying to get it. Some years ago a VHF version of the award was made available to VK stations and this too is a very worthy achievement as a VHF operator will tell you. To have any real meaning there must be some sense of achievement in attaining the requirements for an award. The WAWKGA awards have this and to get either even on takes a lot of persevering. There is no value in an award that can be obtained at a very short time as it doesn't seriously promote activity or represent any definite achievement that is out of the ordinary.

What I would like to suggest is an award to be available to VK stations only for contacting all areas of Australia on a minimum of five (5) different bands. The requirements to be the same as those for present WAWKGA award for each band, i.e. one station from VK1 three stations each from VK2, VK3, VK4, VK5, VK6 and VK7, one station each from VK8, VK9 and VK0. Operation to be on any authorised bands but the requirements to be met for stations as above on each band, making a total of 10 confirmations in all. An application could be made for say 80, 40, 20, 15 and 10 metres or, say 180, 20, 15, 10 and 6 metres, etc., as long as the five band requirement is maintained.

After many years of operating on a wide variety of bands I can assure you that such a requirement is sufficiently hard to be interesting but at the same time certainly not so hard as to be unobtainable. This is unfortunately pretty much the case with some of the overseas awards such as Five Band DXCC, etc., where due to our remoteness and different band allocations such as 80 and 40 metres puts local stations at a very severe disadvantage.

One requirement that would be necessary would be to retain the QSL card to prove contact. This is more necessary today than ever before as there are now many stations operating in our bands from within VK who are unlicensed and many operators could find themselves thinking they had an area worked that such may not be the case. By requiring a QSL it is fair to all and no funny business can take place.

To help encourage novice participation a sub-award with a three band requirement could be allowed for 80, 15 and 10 metre operation. This would then make a version of the WAWKGA award available to all licensees regardless of type. Any award obtained at a reduced licence level, i.e.

Novice or Limited, could count towards the full award at a later time, e.g. a Novice having obtained three bands with the Novice call would only have to get another two under the higher grade of licence to reach the same standing as a Full licence applicant.

Yours faithfully,
Geoff Wilson VK3AMK.

21st April, 1978.

The Editor,
Dear Sir,

The latest issue (April 1978) has two articles on aers, and I found them both interesting in concept. However, I found a bit of trouble with both of them.

1. Arthur's (3LJ) article was well written and understandable. My problem was with dimensions. Figure 1 missed one basic dimension. Although the text gave an approximate overall of 175 feet the article also missed telling us whether the dimensions are to centres of traps or between traps. I know it is a matter of cut and dry, but it is nice to know exactly what another chap had, and start from there.

2. Hans' (SACU) article was not dissimilar to those published many years ago. I found it about as readable as the last one — i.e. very heavy going. Hans is obviously a very bright chap, and like a lot of technical writers, assumes that his readers are just as bright. Unfortunately I'm not that bright. He's also given just years ago information to what the amateur and sell beams, but not enough for us home builders to easily reproduce one.

I have one other problem — regarding Contests. There is reference on occasions to "rules the same as last year". This was the case for this year's ARRL CW contest. However, I couldn't find the rules in last year's issues or even for several years back. I finished up not bothering, even though I really wanted to have a go at it. I've been in it many years ago, but didn't try to use the same system because contest rules change from year to year (e.g. RD). Is there some way in which you could have a very simple 4 line summary to each contest each year, giving:—

Times
Scoring system
Exchange numbers each way
Address for sending logs.

I found the same frustration with the WPX

Now I know you have limited space, and you try very hard to actually do what I've suggested. What I'm asking is for a short summary of each contest. Alternately, if rules are the same from year to year, give the date of AR when the previous rules were published.

Yours sincerely,
Bruce H. Sussenschult VK3OR.

Editor's Note:—

1. Perhaps Arthur (VK3JL) could write to me with the information requested and we shall publish it in due course.

2. As contests — the matter has been given to the Federal Contest Manager.

The Editor,
Dear Sir

It is with concern that I read the April 1978 edition of the magazine and find on page 19 an article entitled, "The N.S.W. RTTY Group", by S. E. Molan VK2SG.

Although the article contains some facts about the operation of the Wireless Institute of Australia, N.S.W. Division RTTY Group, there are a number of incorrect statements.

The first is that of the standards for speed and shift. The policy of the Group is that there are no standards at this time laid down for amateur RTTY operation and members are free to utilise such standards as they wish, provided that they are within the P and T, Department's regulations. Operation is currently being carried out in N.S.W. on both 170 and 50 baud Baudot and 110 baud ASCII with both 170 and 850 Hz shifts.

With regard to repeaters it is proposed that the Group will operate a RTTY repeater in the Sydney area in the near future. The Newcastle repeater will be operated by the Maitland Post Institute Radio Club.

The other area of concern is that of the last paragraph's content. The Group is a group under the framework of the N.S.W. Division and as such members of the Group are required to be members of the WIA. The reasons for this are of course obvious although every assistance will be provided to anyone interested in RTTY if they contact the Group.

The Secretary of the Group is Phil Card VK2ZBX and mail can be sent to the Divisional address as indicated.

The author of this article is not a member of the WIA and it causes some concern that something can go to the extent of being actually published in the magazine without its content being verified with the Division concerned.

I would appreciate the checking of articles for publication that purport to represent the views of this Division be done with more care in future.

Ian Mackenzie,
Secretary, N.S.W. Division
Wireless Institute of Australia.

(The article referred to above was provided by the Publicity Officer of the N.S.W. RTTY Group. We therefore did not consider it necessary to check with anyone else as to the accuracy of the article. The standard quoted is a common international HF standard. Further, if an article is of interest to members of the WIA, we will publish it whether or not the author is a member of the WIA.—Ed.)

98 Hensall Street,
Wollongong, N.S.W. 2509

The Editor,

15th April 1978

Dear Sir,

LET'S SET THE RECORD STRAIGHT ON AIDS TO PROPAGATION

In AR of April 1978 under the title — WIA NEWS — Records VHF/UHF, a statement is made which requires comment on behalf of all EME experimenters, past, present and future.

The statement is — "All these contacts were direct without the use of satellites, repeaters, EME or other such aids".

Now look at the type of AID which provided the path to the moon and back at 70cm.

1. The path loss is over 200 dB.
2. There is typically a rapid, random fade over a 15 dB range (several times a second).
3. The AID (the moon) is moving in two dimensions when an azimuth-elevation mounting on the antenna is used, and it moves a distance equal to its diameter each 2 minutes.
4. The AID is 1/2 degree in diameter, as seen from the earth.
5. The AID has a relatively low coefficient of reflection for radio signals.
6. The AID has to be located by astronomical calculations if the sky is cloudy.
7. Doppler frequency shift is present, often to an extent greater than the bandwidth of the receiving system, and it doesn't stay constant.
8. Polarisation of the signal varies by several full rotations over the path on many occasions.

Thus, to achieve echoes, let alone communication, using the moon as an AID, requires equipment, etc., which has to be of a standard much higher than that presently used for purely terrestrial-path contacts (on 70cm and above) — which rely heavily on the presence of AIDS such as the existence at the time of super-refraction ducting and other similar anomalous conditions of the refractive index. Such conditions may occur relatively infrequently over very long paths and when they do it's O.K.

I am in no way detracting from the fine efforts, know-how and perseverance of those amateurs who choose to use the terrestrial path and who have achieved much longer than "normal" distance for contacts on VHF, UHF and SHF, but I'm afraid the little I said of the equipment presently used in Australia for this work would have a hope of achieving anything like an echo from the moon on 70cm or on the higher frequency bands.

Let's face it, the EME path is just another communication path, albeit approximately 36 million miles long — which is available for long distance contacts on the amateur bands of 50 MHz and above, and it may be used by amateurs wherever they are located and in any direction which they may so choose.

The EME path is not like using a Repeater or Satellite (an extra-terrestrial Repeater), as it is a much worse means of propagation of radio waves than the boundary of the duct, air mass boundary condition or anomalous refractory gradient which will successfully propagate a similar frequency radio waves near the surface of the earth — but it will do so if one is prepared to develop the equipment and "know-how" to use it successfully.

After all what is so sacred about "direct" (now direct?) paths inside the ionosphere (which employs AIDS such as reflections, forward scatter, etc.), to achieve long distance communication (sometimes), when the frequency used has the unique property of being able to penetrate the ionosphere? Is there something "in-built" about natural (non-man-made) means of reflection outside the ionosphere rather than other means of reflection/refraction/forward-scatter inside the ionosphere?

Is the use of knife-edge refractions from a mountain range infra-dig? After all, the moon is made up of mountains and earth (not super-reflective green chassell)! So what if you have to go about 15 million miles to get there, first.

HOW LET'S GET DOWN TO "BRASS TACKS"

We amateurs are communicators — right? and one of our aims, particularly at VHF, UHF and SHF, is to make contacts over the greatest possible distance on the earth's surface (in any direction that we please). We can do this by two ways at present:

1. By relying on the use of natural phenomena to propagate the signal between the two points. This requires the station holder to develop their equipment and operating techniques to the utmost to exploit the chosen means of communication over the distance involved.
2. By relying on the use of artificial (man-made) aids, placed such that the path length is increased as much as possible in the desired direction on Amateurs desiring to use these artificial aids have freely to construct or get someone else to construct the device chosen and then place it in the best position (terrestrial or satellite) for the path in which they are interested, then, secondly, to construct (buy) suitable equipment and operate it in the required manner — to achieve communication over paths which are limited in length and direction by the type of device and its location in relation to that of the station.

Encouragement to advancement of amateurs in each of the above two methods of long distance communication at frequencies above 50 MHz differs in my view, because use of the first method relies totally on the abilities of the amateurs at each end of the path. Awards for achievement of the longest distance, under a specific minimum distance, etc. (up to half or three circumferences) is one way which may encourage these people.

When an artificial aid is chosen to be used (and why not, if it will meet the requirements of those involved), then those whose decision it is to construct and to locate the device may be assisted in various ways by other amateurs, in the construction and use of the aid (not abuse) of the device once it is functioning.

Over to you for comment! But don't put EME together with artificial aid to communication, it's just another way, made by nature, and using exactly the same sort of natural phenomena as any other way of getting to the desired point on the earth's surface. "You point's your antenna horizontally or you point's your antenna somewhat upwards", as what?

Lyle Patton VK2ALU.

P.S.: I would suggest that your comment not be along the lines that EME communication will only be successful if high power and tremendous antennas are used, on 70cm, at least. Just a random sample from a recent EME Newsletter —

' JABBOH worked VE7BBG on 3-12-77 JABBOH used 5 yag-s and 250 watts and VE7BBG uses one of the smaller s x z dishes. Since then significantly lower noise figure receive preamp transistors have been developed for general use. I don't want to give you the impression that EME communication is a pushover, it takes lots of time, effort and some know-how to become successful, but amateurs are supposed to be experimenters, or are they?

Editor's comment — Mmmmm — picky picky! — no one has ever questioned the tremendous effort required for EME. Apologies for the non-use of the blue pencil in the item referred to.

I hope that the publishing of this letter in full helps to heal the wound caused and enlightens other amateurs in the challenge and rewards of EME.

Manawatu Branch NZART,
P.O. Box 1718,
Palmerston North

The Editor

31st March, 1978

Dear Sir,

There appears to be some confusion as to the frequency of our six metre beacon. The following information is a summary of the three beacons maintained by the branch.

Location — Mt Stewart: 175° 29' 10" E,
40° 12' 20" S

Height — 135m ASL

Mode — +800 Hz FBK, call sign "ZL2VHF"

Radiation — horizontal polarisation, omnidirectional

Frequency — 58 mcs, 52.650 MHz, 2 metres,
145.280 MHz; 70 cm, 432.250 MHz.

The branch would appreciate reception reports and comments on any of the beacons. These should be addressed to:

VHF Beacons P.O. Box 1718,
Palmerston North, New Zealand.

An application has been lodged for a second 6 metre beacon, this to be operated by the Upper Hutt Branch and located on Mt Cible, which is about 30 miles NE of Wellington. Other details are not known at this stage.

H N, Wiggins ZL2BFR, Beacon Trustees.

P.O. Box 22,
Halls Gap

The Editor

26-4-78

Dear Sir,

May I try to bring your and your readers' attention to the planned introduction of a 100 kW channel 5A TV transmitter, to be located at Mt. Dundas in western Victoria. To believe, can be considered another coffin nail driven in to wrest the 2 metre band from our possession, and I'm told is only the start of a planned proliferation of channel 5A transmitters around Australia. Whether we are operating on the 888 or FM sections of this band, we must consider this action a threat to our occupancy of yet another VHF band.

The 432 MHz band is under threat and s x metres is unusable in Brisbane and Melbourne, 220 MHz is just a dead memory to some, and 11 metres is our latest example of how tenuous our hold on any frequency is.

The possible interference to Oscar satellites, TVI and receiver front end problems will inevitably drive more and more operators from 2 metres and, with the commercial clamouring for more band space, 4 MHz of almost unoccupied spectrum will look very attractive.

With WARC 79 and other problems, we as amateurs must back the WIA as one, both with representations to our Government and financial help.

Please, whether you are a HF or VHF operator, the Wireless Institute of Australia needs all amateurs' support as the only recognised body representing our interests.

Yours faithfully,
Robert Wilkins VK3AUR.

(The message is only too clear.—Ed.)

The Editor.

16-4-1978

Dear Sir,

Would you please grant me space to reply to a letter in these columns by VK3SV regarding a previous letter of mine on the controversial G5RV antenna.

Except for the first paragraph in VK3SV's letter, it was most constructive. I would explain to VK3SV that I did not read the excellent articles in AR 1974 for the amateurs concerned, because at that time I was busy putting together one of the country's most unique radio, gramophone and movie museums, dealing with such matters as to obtaining a spark coil for a 1912 Telefunken spark transmitter, a diaphragm for a 1926 Western Electric 17A exponential theatre horn, the correct adjustment for the shutter of an 1899 Edison project "Kinetoscope", and so on.

VK7NOW did not come on the air until December 1977.

Regarding my "yash" statements re the length of the 300 ohm flat ribbon feeder stub for the G5RV, I merely quoted what was told to me during a QSO with a ZL, and I repeat his words, "I have had many contacts with G5RV on 40 metres and he informed me that, somehow, the textbook have got the wrong information — the correct length is 32 ft. 6 in."

I would therefore assume that G5RV knows what he is talking about — he designed the antenna.

I agree entirely with VK3SV that any specific type of antenna does not perform the same in all locations. There are many variables, such as nearby objects which absorb or reflect radiation, the Geometer reading of the ground, and so on.

VK3SV states that he started off with a certain length feeder, then trimmed it back to 29 ft. 3 in. for zero SWR.

That is like starting out with a Dalmier double six and because it uses too much petrol, to replace this with an XJ6 motor.

I have it on good authority that, provided all the measurements are correct, the way to reduce the SWR is to vary the length of the 75 ohm coax — not the 300 ohm stub.

However, at its best, the G5RV is only a compromise all-band antenna, which is ideal for portable work, because it is easily transported and erected.

No multiband wire antenna (except a Rhombic) is as good as a beam on 20, 15 and 10 metres, and no multiband antenna is as good on 80 metres as an inverted V which is cut for a specific frequency.

To summarise I would say this. Beware of the "law of commonness" and realise that theoretical capabilities of antennas are seldom realised in practice. Think carefully before putting up any antenna — is it suitable for the job in hand? Finally, accept the fact that there is no wonder "antenna to end all antennas" — some types are more suited for certain jobs, but they all have their limitations, even the mighty Rhombic.

Finally, when VK3SV and myself have gone to "the big broadcasting station in the sky", mere mortals on earth shall still be arguing that such and such antenna is better than the other.

Yours sincerely,
Jim Davis VK7NOW

REPEATERS

At the recent Federal Convention in April it was agreed that there would be no change to the FM Section of the 70cm band.

The FM Section is reprinted below:—

436

.025
.05
.075 — Mobile Voice
.1
.125
.15
.175
.2
.225 — Mobile Voice Prim.

Repeater
Outputs

Simplex

Repeater
Outputs

25
.275
3
35
.375
375 — Mobile Voice
4
.425
.45
.475
.8
525 — Mobile Voice Nat. Prim.
55
.575
.6
625
65
675 — Mobile Voice Prim.
.7
725
.75
.775
8
825 — Voice Prim.
85
875
9
925
95
975
436.0 — Voice Nat. Prim.
.025
050
.075
.1
125 — Voice Prim.
.15
.175
.2
.225
25

.275 — Mobile Voice
.3
325
.35
375
4
425 — Mobile Voice
45
.475
.5
525
55
575 — Mobile Voice
6
625
65
675
7
725 — Mobile Voice
75
775
8
825 — Mobile Voice
85
875
9
925
95
975
440.00

Inputs are 5 MHz
below outputs.

All primary repeater channels to be allocated in each State first.

All channels not designated for Voice can be allocated by a State or the Federal Repeater Committee as required (linking repeaters or for use on other modes).

Therefore at this stage the UHF mobile service has ten repeater and three simplex channels.

The following Band Plan for FM on 2 meters is printed for comment before being put to each Division for voting. All comments to be sent to the Federal Repeater Committee care of the Federal Office in Toronto.

RECOMMENDED MODIFICATIONS TO THE VHA BAND PLAN FOR THE 144 MHz BAND

1 INTRODUCTION

There appears presently to be a need to make provision for additional simplex and repeater channels in the segment 146-148 MHz, and to provide additional channel space for various special purpose communications.

The Committee has also considered the need to keep primary voice communication channels and special purpose channels clearly distinct from one another, preferably by allocating these two types of channels in distinct segments of the band.

It would also appear that, in order to provide an adequate number of simplex and repeater channels for the future, it is desirable to implement a 25 kHz channelling system.

2. RECOMMENDATIONS (See Chart below)

2.1 That primary voice communication channels (simplex and repeater) be located in the segment 146-147 MHz.

2.2 That special purpose nets (special liaison nets, data nets, etc.) and special purpose or local coverage repeaters be located in the segment 147-148 MHz.

2.3 That 25 kHz channelling be implemented as follows —

(a) **Simplex:** Immediate availability of all possible 25 kHz simplex channels in the segments 146-147 and 147-148 MHz.

(b) **Repeaters:** in the segment 146-147 MHz, only repeater channel pairs on 50 kHz channel spacings to be provided at present; 25 kHz splits reserved for future use. In the segment 147-148 MHz, 50 kHz and 25 kHz split channels both to be immediately available, with no priority of usage.

2.4 That repeater channels be allocated by State Repeater Committees, bearing in mind, however, that certain special purpose repeater channels may be allocated on a national basis.

3. DISCUSSION

3.1 It is felt that the proposed system conforms well with existing usage and requirements within all States.

3.2 By concentrating the major voice communication on channels (simplex and repeater) within the segment 146-147 MHz, this plan provides for greater convenience of channel switching than would be the case were these channels spread across the full 2 MHz.

3.3 Interference problems between major voice communication channels and special purpose channels are minimised by allocating them in separate segments of the band. This is especially valid in the case of microprocessor and data nets, with the implementation of 25 kHz channelling, high speed data transmissions would cause interference problems to adjacent speech communication channels.

3.4 This plan does not in any way reduce or limit the number of channels available, nor the freedom of State repeater committees to allocate them as they see fit.

146-147 MHz PRIMARY VOICE COMMUNICATION CHANNELS

Repeater inputs	50 kHz splits existing channels	25 kHz channels splits
146.000		
	.025	
	.050	
	.075	
	.100	
	.125	
	.150	
	.175	
	.200	
	.225*	
	.250	
	.275	
	.300	

		.325
		.375
		.400
		.425
		.475
		.525
146.5 = national calling ch.		.500
146.45 { primary		.550
146.55 { primary		.575
146.60 = RTTY** (national)		.600
others secondary		
Repeater outputs		.625
		.675
		.700
		.725
		.750
		.775
		.800
		.825
		.875
		.900
		.925
		.950
		.975
		147.000

25 kHz splits
* Repeater channels reserved for possible further use.
** All simplex available immediately.
*** RTTY channel is an exception to the recommended rule of allocating special purpose nets above 147 MHz, as it is an established and well populated channel.
The simplest method of designating 25 kHz simplex splits is to give them a letter, e.g. 146.475 = 48A, 146.525 = 50A.

147-148 MHz LOCAL OR SPECIAL PURPOSE OPERATION (voice or data)

No distinction in priority between 50 kHz and 25 kHz channels.

Repeater outputs	Channel	Suggested use
147.000		
	.100	
	.125	ATV liaison (nat.)
	.150	
	.175	
	.200	
	.225	
	.250	
	.275	
	.300	RTTY (national)
	.325	RTTY (national)
	.350	
	.375	
Simplex (special purpose)		
	.400	ATV liaison
	.425	ATV liaison
	.450	ATV/SSV/FAX
	.475	SSV/FAX liaison
	.500†	not yet allocated
	.525	not yet allocated
	.550	micro net
	.575	data net
	.600	data net
Repeater inputs		
	.625	
	.650	
	.675	
	.700	ATV liaison (nat.)
	.725	
	.750	
	.775	
	.800	
	.825	
	.850	
	.875	
	.900	
	.925	RTTY (national)
	.950	RTTY (national)
	.975	

	.625	
	.650	
	.675	
	.700	ATV liaison (nat.)
	.725	
	.750	
	.775	
	.800	
	.825	
	.850	
	.875	
	.900	
	.925	RTTY (national)
	.950	RTTY (national)
	.975	

† Already in use for this purpose in VHX and VXC.
* Recommended nationally.

It is used in bigger States as national secondary voice channel. It was felt that 7 simplex channels that were specifically allocated was sufficient for all States (to keep within the principles outlined in para. 3.1 and 3.2).

MT. GININI REPEATER STOLEN

On Saturday morning (1st April 1978) the Channel 7 repeater on Mt Ginini was stolen.

The OCA compound was entered using bolt cutters and the University building was broken into through the side by removing the metal cladding and insulating material. The power cable was cut, turning off the University's seismic recording equipment. This accurately established the time of theft at 6711.

The only equipment stolen from the hut was the repeater, which comprised the power supply, duplexer, receiver, and transmitter. This was done in such a way as to suggest that the equipment is going to be put back into service.

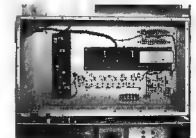
The matter is being investigated by the ACT Police and the District Radio Inspector is assisting with the enquiries.

The Committee of the ACT Division has resolved to re-establish a new repeater as soon as possible. To this end a fund has been established with an initial target of \$1,000.

Unfortunately a new facility will not be available until after winter. This therefore makes the return of the original equipment vital. If anybody has any information on this matter it should be forwarded to the Secretary, ACT Division, P.O. Box 48, Canberra City.



The repeater is unique in its design using eight home constructed aluminium cavities. The design is based on the ARRL repeater handbook.



Transmitter with aluminium cover removed.

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for 70 cm or 50 cm operation | \$25.00 | 8. ANTENNAE — 70 cm & 50 cm: | |
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(including crystals) | \$55.00 | OPTION 1 —
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| 4. POWER AMPLIFIER & MODULATOR ASSEMBLY
— 12W sync. tlp (not inc. Heat Sink) | \$118.00 | OPTION 2 —
16 dB1 Long Yagi, fully assembled and
tested (length 3.6 metres) | \$55.00 |
| 5. 12W ATV TRANSMITTER — Complete,
fully assembled and tested | \$250.00 | OPTION 3 —
Stacked Arrays of above Antennae inc.
feed harness and all mounting hardware | POA |
| 6. LOW LEVEL (10 mW) 1296 MHz EXCITER,
Inc. modulator and microphone amplifier
(16 F3) — Not including Xtals | \$70.00 | 9. LINEAR POWER AMPLIFIER — 40W &
80W PEP 70 cm, 5 dB gain, VSWR pro-
tected BNC input and type N output,
connectors. No T/R switching provided
unless requested | POA |
| 7. LOCAL OSCILLATOR ASSEMBLY FOR
1296 MHz APPLICATION (including drive
level monitor output) — 5-10 mW output | \$65.00 | 10. POWER SUPPLY, 13.8V 4 amp (S.E.C.
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434 -- 436 MHz, input frequency 144 to 146 MHz.

Get away from the maddening crowd below. The MMT432/144'S' 434 Linear Transverter will get you there. This solid state linear made transverter allows you to operate your 144 MHz SSB, AM, FM or CW units at 432 MHz up where there still aren't a lot of people. Amateur Electronic Imports is the exclusive Australian distributor for this precision British made unit from Microwave Modules, Ltd.

NEW RELEASE for OSCAR 8 down link — 70CM converter model
MMC434/28, coverage 434 to 436 MHz. **PRICE \$51**

TRANSVERTERS Model MMT432/28 S, coverage 432 to 436 Price \$245
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Our extensive range includes: Converters MMC432/28—432/144 Price \$51
144/28 Price \$45, 144/28LO and 52/28LO Price \$49, MMC1296 and
1296/144 Price \$65, Varactor Tripler MMV1296 Price \$74, 500 MHz
counter MMD050/500 Price \$175, MMT Power supply \$94.

SPECIFICATIONS

Frequency coverage 432—436 MHz.
Input frequency range 144—146 MHz.
DC power requirements 11-13 volts
(12 volts nominal).
Current consumption. 250 mA quiescent 2.1 Amps peak.
RF connectors: 50 ohm BNC sockets
Power connector, 5 pin DIN socket
Size: 187 x 120 x 53 mm
Weight: 900 grams. **PRICE \$ 295**

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FT-225RD

**SSB, CW, AM, FM
SOLID STATE
PLUG IN MODULE**

2 Meter All Mode DIGITAL READOUT TRANSCEIVER

Features

■ Full Coverage

The FT-225RD provides operation on all modes — SSB, CW, AM, and FM — over the entire 4 MHz of the 2 meter band.

■ PLL Circuitry

The local oscillator employs the modern Phase Locked Loop (PLL) technique, with its fundamental oscillating in the 130 MHz range. This effectively eliminates spurious radiation and yields a clean output signal. On receive, the PLL likewise rejects unwanted out-of-band interference.

■ Frequency Memory Option

Following the design philosophy pioneered in the FT-901DM HF transceiver, an available option for the FT-225RD is a memory unit which allows storage and recall of any frequency within the range of the transceiver. This circuitry allows

instant, programmable QSY to a favorite repeater or calling frequency with only a flick of a switch.

■ Digital Plus Analog Frequency Readout

The digital display uses large, bright LED's for maximum readability, with resolution to 0.1 kHz. The front panel lights and display may be dimmed, too, for nighttime mobile operation.

■ Versatility Features

Squelch, VOX, PTT, semi-break-in CW with sidetone, and tone burst are standard features on the FT-225RD. A superb noise blanker permits mobile SSB operation, and a discriminator center meter allows precise zeroing on FM signals. The clarifier produces ± 3.5 kHz offset of either the receive or transceive frequency during VFO, memory, or fixed channel operation.

■ Fixed Channel Operation

Up to 44 simplex or repeater channels may be installed through insertion of optional crystals in the FIX unit. These crystals are available through your Yaesu dealer.

■ AC/DC Capability

The FT-225RD may be operated from 13.5 VDC, or from AC voltages of 100/110/117/200/220/234. Choice of AC or DC power is made by connection of the appropriate power cable to the receptacle on the rear panel of the transceiver.

■ **Solid-State Modular Construction**
Yaesu's renowned plug-in circuit boards are utilized in the FT-225RD, providing maximum reliability and ease of servicing. All circuits are fully solid-state, using IC's and FET's for maximum performance capability within a compact case.

Full metering: Relative power output, signal strength and discriminator center

VOX gain PTT MOX switch

~ 600 kHz or optional auxiliary repeater split

Selectable AGC

All mode coverage SSB CW AM FM

Clarifier for either receive or transceive frequencies

Analog readout with resolution to 1 kHz. Dual speed tuning dial for rapid QSY or fine tuning

Digital frequency display with resolution to 100 Hz

LED indicators for RPT, CLAR, VFO, MEMORY, RECALL, ON AIR operation

SSB Mic gain RF out put control

RF attenuator activation switch

Noise blanker activation switch

Select switch for frequency control: By VFO RX or optional memory control of simplex TX or RX frequencies

Tone burst activation switch

Front panel lamp: digital display dimmer for energy conservation

Up to 31 fixed channels using optional crystals

Optional memory storage switch

FT-225RD without Digital display available at lower price.

Our years of handling and specializing in this equipment have enabled us to build up a fund of knowledge and technical experience, backed by a comprehensive range of spare parts and service facilities. We don't just sell a set, our concern extends throughout the life of your equipment.

Contact us for details of other Yaesu equipment plus the accessories required to complete your station.

All equipment from Bail's carries a full 90-day warranty and complete service back-up.

Prices and specifications subject to change without notice.



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exclusive to Bail Electronic Services.**

The success story of the export quality FT-101 must make world amateur radio history. First produced in 1970 the FT-101 has been refined and improved to make it better than best for your money. The latest FT-101E represents tried and proven performance and real value. You'd have to say it will be the best selling HF amateur transceiver in the world.
The FT-101E can be modified to suit novice requirements.

It comes complete with a **more effective noise blanker specified by, and exclusive to, Bail Electronic Services** R F Speech Processor, Calibrator, matching Yaesu Hand Microphone, eight pole SSB filter, 12v DC-DC converter as well as 234v AC operation with Australian approved 3 core cable and 3 pin plug, **factory produced English language handbook** (not a photo-copy!), spare plugs and connectors, etc.

Features:

- Built-in AC & DC power supplies
- Built-in RF-speech Processor for increased talk power (E model only)
- 260 Watts PEP SSB, 180 Watts CW, & 80 Watts AM
- Factory sealed, solid state VFO for optimum stability and accurate 1 kHz readout
- Effective Noise Blanker, threshold adjustable, for elimination of noise spikes
- Built-in, fully adjustable VOX
- Automatic break-in CW operation with sidetone
- Selectable 25 kHz and 100 kHz calibrator
- ± 5 kHz receiver clarifier w/separate ON/OFF switch
- Built-in WWV/JJY reception
- Heater switch to shut off final tubes for conservation of current drain
- Reliable easy to operate lever switch
- Adjustable carrier level for tune-up and novice operation
- Built-in speaker

- High-Q, permeability tuned, RF stages to provide the performance required even in base station operation
- Includes dynamic, hand-held type microphone
- Indicator lights for internal VFO and clarifier operation
- Eight pole SSB filter for unparalleled selectivity on today's crowded bands
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Price \$895.00 90 day warranty. Price includes sales tax. Freight and insurance extra. Prices and specifications subject to change without notice.
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VK0	VKOMa, Mawson	63.190
VK1	VK1TA, Canberra	146.475
VK2	VK2WV, Sydney	32.450
	VK2WV, Sydney	146.018
	VK2WJ, Milongga	146.120
VK3	VK3RTQ, Vermont	144.795
VK4	VK4RTL, Townsville	22.440
	VK3RTT, Mt. Mounbatten	146.480
	VK4RMB, Brisbane	422.490
VK6	VK6VF, Mount Lofty	53.96
	VK6VF Mount Lofty	146.800
VK9	VK9RTU, Perth	2.300
	VK9RTU, Kalgoorlie	82.338
	VK9RTW, Albany	82.098
	VK9RTW, Albany	144.500
	VK9RTW, Perth	145.098
VK7	VK7RTT, Laureston	32.400
	VK7RTT, Ulverston	146.800
	VK7RTW, Ulverston	432.478
VK8	VK8VF, Darwin	82.290
JA	JA21GY, Nagoya	82.680
K0E	K0G6Q, Guam	80.110
K0H	K0H6G, Hawaii	80.110
Z1	Z12NA, Costa Rica	88.800
Z1	Z1WMA, Los Angeles, USA	88.800
TL	ZL1YHV, Auckland	145.018
	ZL1YHV, Waikato	148.184
ZL2	ZL2MHF, Upper Hutt	29.170
	ZL2YHV, Palmerston North	52.800
	ZL2YHV, Wellington	146.200
	ZL2YHV, Palmerston North	146.200
	ZL2YHV, Christchurch	148.300
ZL3	ZL3YHF, Dunedin	148.300

Page 42 Amateur Radio June 1971

DM5323/M	1564	DM1428/M	780
DM7215/I	1500	DM3501/G	540
DM8252/H	1000	DM8754/A	234
DM8701/G	1488	DM8550/N	130
DM8721/G/A	1078	DM8550/A	90

CW			
DM-6754/A	2014	JAO-2811	629
DM8079/O	800	JAS-3891	68
DM8721/G/A	110	JAS-8783	56
JA1-4570	3440	JAS-1231/3	40
JA7-6554/7	4254	OKC-1949	308
JA4-4865	1440	OKI-11891	818

AROUND THE TRADE

PRQ-7 OWNER'S GUIDE

Dick Smith has introduced a guide to the Yaseu PRQ-7 Short Wave Receiver which, according to Dick, "continues from where the instruction booklet with the set leaves off".

The step-by-step guide was written specially for Dick Smith by noted short wave correspondent Arthur Cusker, M.B.E.

It describes the step-by-step procedure for tuning stations on known frequencies, provides information on international short wave and amateur bands to listen to, explains the 24 hour clock and G.M.T. time transmission times and frequencies for broadcasts for the major short wave transmitting countries of the world and concludes with a run-down on short wave listening as a hobby. Dick Smith is offering this useful guide FREE with each Yaseu PRQ-7 receiver sold through his eight electronics stores or by his mail order department.

NEW PRESELECTION FILTERS

Spectrum International's Low Loss factory tuned, Pre-Selector Filters are a 3 pole inter-digital design. They have the traditional bar transmission line structure and are constructed from brass stock.

The electrical design approximates to a 0.1 dB ripple, Tchebycheff characteristic.

TECHNICAL DATA

PF1432 — J583.70, freight extra. Freq. range (MHz) 420-450, Ripple, typ. 0.1 dB; I.L., typ. 0.15 dB; Impedance, nom. 50 ohms; VSWR, peak, typ. 1.25; Shape Factor, 30 dB 4:1; Power, max. 100W, Mech. Data Length (plus coax) 7 1/2 ins.; Width 4 1/2 ins.; Thickness 1 inch; Connectors, std. BNC.

PF21901 — U5548.95, freight extra. Freq. range 1650/1750; Ripple, typ. 0.1 dB; I.L., typ. 0.2 dB; Impedance, nom. 50 ohms; VSWR, peak, typ. 1.25; Shape Factor, 30 dB 4:1; Power, max. 100W, Mech. Data Length (plus coax) 2 1/2 ins.; Width 4 1/2 ins.; Thickness 1 in.; Connectors, std. TNC.

PRESELECTION FILTER APPLICATION NOTES

Low loss pre-selector filters exhibit high attenuation to out of band interfering signals and negligible loss to desired in-band signals. They also attenuate the "image noise" band in heterodyne receiving systems thereby providing up to 3 dB improvement of receive system noise performance.

Receiver front end selectivity is difficult to realise in the typical small UHF converter. The addition of an external pre-selector filter can result in much improved performance for the sensitivity and out-band intermodulation (IMD) characteristics.

In urban areas having high concentrations of FM, TV and mobile radio transmitters, most receivers have excessive "birdie" responses due to signal of band signals. The addition of a pre-selector filter before the receiver tends to eliminate the spurious responses. In fact many receivers seem dead after fitting a pre-selector filter due to the resulting very low background noise, but jump to life whenever an in-band station is tuned in.

Another excellent application is following an up-converter, to clean up the transmitted spectrum before high power amplification.

Let's keep our transmissions clean.

— Submitted by Spectrum International.

Spectrum International of Concord, Massachusetts, USA, have advised that their XF102 filter is no longer available and all stocks are exhausted. The XSA-107-S04 will continue to be available as before. XSA-107-S04 will continue to be available as before.

QSP

MR. GININI RESPONDS

From the President of the VK1 Division comes news that the fund for the replacement of the Mr. Ginnini repeater will be closed on 30th June, 1978, although any later donations would naturally be accepted with grateful thanks. A list of donors will be prepared for publishing in AR at a later date.

IARU NEWS

The following items have been extracted from the IARU Calendar No. 85—

"In the last end-of-year Calendar, we characterized 1978 as a year of growth. The year 1977 carried forth that growth, as the Union welcomed into membership eight new societies, representing amateur radio in Bahrain, Botswana, Indonesia, Jordan, Oman, Papua New Guinea, Sierra Leone, and Turkey. The membership of the Union now stands at 98, and applications have been received from Grenada and Senegal (ballots and full details enclosed in this Calendar).

Preparations for the 1979 World Administrative Radio Conference continued throughout the year to be the prime task of the IARU. The International Working Group met again, this time in England, and produced a four-page leaflet entitled 'The Case for Amateur Radio', designed for use by IARU member-societies in their efforts to justify the Amateur Radio Service to their administrations. 'Use it, or lose it!' became the motto stressed in the monthly WARC Newsletters mailed from Headquarters - a motto of amateurs as we continue to justify our present frequency allocations and our demands for more. To this end, amateurs in Australia shattered the 1296 MHz world distance record when VK2GW successfully established two-way communication with VK3OR 1886 kilometers (1178 miles) away on 25 January. YV6Z and LU1UDJ subsequently smashed the world's two-meter record when they spoke over a distance of

5000 Kilometers (3107 miles) in October. Such breakthroughs by amateurs add us considerably in justifying our claims that amateurs continue to contribute to the state of the art in electronics, and to offer significant findings in propagation theory."

The Organised Amateur Radio Indonesia was elected to membership of the IARU.

"The Deutscher Amateur Radio Club, the society of the Federal Republic of Germany, gave 600,000 visitors an impressive demonstration of amateur radio at the Berlin International Radio and Television Fair. Over 100 square yards of floor space were made available to the DARC volunteers, and DK0IA was put on the clock. All Berlin amateurs were invited to an outdoor barbecue on 27 August (held between exhibition tents so all fair-goers could see first-hand how many hams were in the area).

The DARC volunteers set up displays on Oscar satellites, state-of-the-art design of amateur equipment, and VHF repeaters. West Berlin's repeater, DL0SP, was linked to repeater OL0UN at the French-German border, and daily reported the activities to DARC headquarters at Bannau.

Audience participation is important in holding interest, so a visitor's bar was set up complete with headphones for attendees to savecord on DK0IA. Also a map outfit with light bulbs flashed the location of each QSL card, teaching a lesson in geography as well as in international friendship.

The Bonn chapter of DARC has taken over the Federal German Chancellor's office, displaying 200 QSL cards and 20 radio awards and diplomas on the reception area walls. The display is intended to represent typical amateur radio activities. So far at least 54 newspapers throughout the Federal Republic of Germany have published stories on the unique display."

On 12th February, 1978, KP4EOR established a successful two-way SSB contact with LU5DJZ, a distance of 6,319 km. A contact was also made with LU3AAT.

Two further amateur societies are seeking IARU membership. These are the Grande ARQ and the Assoc des Radio-Amateurs du Senegal.

The President of the IARU, Noel B. Eaton VEC3J, advises that the work of his WARC Advisory Committee (loosely known as the IWG) seems now to have completed the preparatory phase of planning for WARC 79 and that it be transformed into the actual team to represent IARU at WARC 79. These conclusions were reached at the meeting of the Group in Geneva last February, which was also attended by David Wardlaw, the Federal President. Whilst the team to WARC 79 cannot be completely finalized at this early date, the IARU President has chosen the following for the basic team: VEC3J, W4KFC, W1RU, K1ZZ, WA6DIN, SP5FM, OA4AV and VK3KI.

There will be, he states, further nominations to this basic WARC team. He will be attending the meetings of all three IARU Regions to be held during the year.

Meanwhile, the IARU group referred to has produced an excellent leaflet entitled "The Case for Amateur Radio", designed to assist the amateur societies of developing countries in educating their national administrations on the need for the Amateur Radio Service in these nations. Copies will be in English, French and Spanish. The leaflet is quite one of the best on amateur radio ever produced and it is sincerely to be hoped it will be read and understood by administrators in over-numerous less developed nations possessing an ITU vote.

The WIA recently received news that arrangements had been concluded between DARC (West German Am. Radio Society) and the Radio Society of Sri Lanka whereby a number of DARC members had volunteered to participate in a training course to be held in Colombo during October for amateur radio trainees. The course would be held in Colombo and the expenses of the project would be met as to 50 per cent by IARU Region 1, with some contribution from IARU Region 3. The WIA



432 Linear Amp. — EDL432.

PS1290 — J5838.70, freight extra. Freq. range (MHz) 1250-1340, Ripple, typ. 0.1 dB; I.L., typ. 0.2 dB; Impedance, nom. 50 ohms; VSWR, peak, typ. 1.25; Shape Factor, 30 dB 4:1; Power, max. 100W, Mech. Data Length (plus coax) 3 1/2 ins.; Width 4 1/2 ins.; Thickness 1 inch; Connectors, std. TNC (BNC avail.)

AMATEUR RADIO ACTION

(published by Newspress Pty. Ltd. — publishers of CB Action)

IS THE NEW GENERATION AMATEUR MAGAZINE



Whether you're a CBer, wondering how hard it is to become a Novice, a Novice — wondering how hard it is to obtain your full ticket, or an old time ham — wondering what the hell is going on anyway — we think you will find plenty to interest you in this new magazine.

AMATEUR RADIO ACTION will go on sale at newsagents throughout Australia during the last week of May (NSW and Vic) and the first week of June (all other states).

The topics covered will include in-depth technical reports on the latest equipment by David Rosenfield (VK3 ADM), reports on DX activity on all bands, what's happening in VHF, UHF, RTTY, SSTV AND ATV, international reports on overseas amateur operations, "build it yourself" technical projects, propagation forecasts... and the many other things which go to make for interesting and informative reading.

We firmly believe that a magazine, be it on motorsport or amateur radio, should make interesting reading—we think you will agree that AMATEUR RADIO ACTION fills this requirement.

The magazine is dedicated to the advancement and promotion of amateur radio and, most importantly, assist-

ing the student and Novice while, at the same time, not being "written down" to the extent whereby the old time ham has little to gain from it.

The views of AMATEUR RADIO ACTION may not coincide with those of the "establishment" — but surely a fresh approach and controversial ideas can often cause major and/or minor reforms to the benefit of everyone.

For instance, why should ITU standard morse be the standard for examinations when you're rarely likely to hear it on air anyway?

Why are copies of past Novice exam papers impossible to obtain although copies of the A.O.C.P. papers are readily available?

Are multiple question A.O.C.P. papers to be introduced — if so, when?

These are just a few of the questions which we'll be looking at in the first few issues of AMATEUR RADIO ACTION.

IF YOU'RE INTERESTED IN RADIO, THEN SOONER OR LATER YOU WILL BE INTERESTED IN AMATEUR RADIO — AND AMATEUR RADIO ACTION MAGAZINE IS THE ONE YOU'LL BE READING ...!

First issue on sale last week of May (Victoria & New South Wales) — first week of June (all other states)

Available at all newsagents throughout Australia

Executive decided this was a most worthy project and donated \$250.

On 1-1-1979 the CCIR will have been in existence for 50 years.

TELECOMMUNICATION JOURNAL COMMEMORATES 20 YEARS OF SPACE FLIGHT

The October number of the Telecommunications Journal*, the monthly review of the International Telecommunication Union (ITU), commemorates 20 years of artificial earth satellites by publishing two articles, one evoking the very beginnings of satellite techniques, the other dealing with an application of satellites which has, as yet, only been introduced on an experimental basis.

The first article, by L. S. Vedeshin and V. P. Dudykin, describes the preparation and launch on 4 October, 1957, of Sputnik I, the world's first artificial satellite.

In the second article, entitled "The Broadcasting-Satellite Conference", Ib Lomberg, the Chairman

of the conference which was held in January-February of this year in Geneva, discusses the Plan for direct broadcasting from satellites in the 12GHz band.

Earlier this year the Telecommunications Journal published a "Table of artificial satellites launched between 1957 and 1976" (price: 25 Swiss francs), which is a complete list of all satellites successfully launched from Sputnik I until the end of 1976.

* Telecommunication Journal, separate editions in English, French and Spanish. Subscriptions, by surface mail: one language, 75 Swiss francs a year; two languages, 150 Swiss francs a year; three languages, 225 Swiss francs a year. Price for a single copy, 7.50 Swiss francs. There are special rates for delivery by airmail. The Telecommunication Journal may be obtained from the Sales Division, International Telecommunication Union, Place des Nations, CH 1211 Geneva 20 (Switzerland).

AOCP EXAM AUGUST 1977

POSTAL AND TELECOMMUNICATIONS DEPARTMENT

AMATEUR OPERATORS' CERTIFICATE OF PROFICIENCY

August, 1977

SECTION M (Theory)

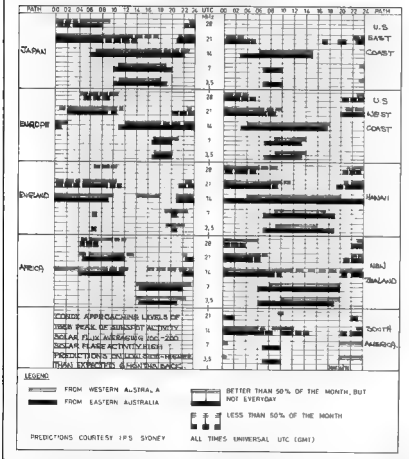
(Time allowed — 2½ hours.)

NOTE — SEVEN questions only to be attempted. Credit will not be given for more than SEVEN answers. All questions carry equal marks.

1. (a) Draw the circuit diagram of an amateur station transmitter suitable for operation in the 144-148 MHz band. Explain briefly the theory of operation of each stage of the transmitter.
(b) Describe how you would tune the transmitter described in (a).
2. (a) With the assistance of a sketch indicate the ionospheric layers which exist during hours of —
(i) daylight, and (ii) darkness.
(b) Explain the meaning of the term maximum-usable-frequency (M.U.F.). Explain why this frequency is not constant over a long period.
3. (a) With the aid of a sketch showing the main component parts, explain the theory of operation of a cathode-ray tube.
(b) Show a method of connecting a cathode-ray oscilloscope to a telephony transmitter to indicate its depth of modulation.
(c) Sketch the pattern obtained when using the connections shown in (b) if the carrier is modulated at a depth of 100 per cent.
4. (a) What is meant by the following terms when used in reference to an iron-cored transformer:
(i) turns ratio; and (ii) impedance ratio.
(b) List the losses associated with the operation of a power-transformer and state how these may be minimised.
5. (a) Using diagrams, explain the principle of operation of a crystal microphone.
(b) Draw a circuit diagram of a solid-state pre-amplifier, the input impedance of which will approximately match a crystal microphone.
6. (a) Draw a circuit diagram of a DC-DC converter and explain the theory of operation.
(b) List any advantages the converter in (a) has over the vibrating reed type converter.
7. Draw a circuit diagram of the radio-frequency amplifier and converter stages of a transistor type superheterodyne receiver. Explain how oscillation is produced in the converter and how the incoming signal is mixed with the oscillator frequency to produce the desired intermediate frequency.
8. Under what circumstances would you use —
(i) an absorption wavemeter,
(ii) a heterodyne type frequency meter,
(iii) Lecher wires,
(iv) a grid-dip oscillator,
(v) a cavity resonator?
9. A resistance of 3 ohms is connected in series with three resistances in parallel of 20, 50 and 70 ohms respectively. This combination is connected across a 30 volts power supply. Calculate —
(i) the total current flowing,
(ii) the power dissipated by the 50 ohms resistor,
(iii) the current through the 20 ohms resistor.

IONOSPHERIC PREDICTIONS

Les Poynter VK3ZGP/NAC



Due to circumstances beyond my control I have no summaries to offer with this month's chart. However, news is that solar activity has now reached a level equivalent to the peak of cycle 20 in 1968. Forward predictions are being revised to an extended smoothed running number around 150 is approximately 15 months time. Then a broad peak extending over perhaps 18-24 months.

There are many indications that the higher frequency bands 26 and 50/52 MHz will really come to life as indeed reports do indicate quite extensive DX being worked on both 10 and 8 metres.

I am currently preparing a brief report on cycle 20 and awaiting further information regarding forecasts for cycle 21 to add to the report. I am enjoying some fine DX on 21 MHz to just about all parts of the world.

Of course winter will see some changes in some bands but the equinox periods in September 1978 and March 1979 will produce some really fine DX on all bands. If you are not prepared — now is the time to get ready to join the QRM on all bands.

More next month.
Good DX, 73s VK3ZGP/NAC.

NEW BOOKS FROM NEWNES — BUTTERWORTHS for the RADIO ENTHUSIAST



NEWNES TAPE RECORDER SERVICING MANUAL 2nd Edition — Volume 1 & 2 — Gardner

NEWNES TAPE RECORDER SERVICING MANUAL volumes 1 and 2, provide the service engineer with information on a wide range of reel-to-reel and cassette machines produced between 1965 and 1974, following broadly the lines established in Tape Recorder Servicing Manual by H. W. Hellyer covering machines produced before 1965. Volume 1 covers models produced on the period 1965 to 1970 while Volume 2 covers 1971 to 1974 models.

The information given is as concise as possible consistent with providing the engineer with the most important tests and adjustments and assumes that the engineer has a basic knowledge of test procedures. In the case of some of the older models these volumes may well represent the only source of information, covering over 100 individual models. Each entry includes at least a circuit diagram, supplemented in most cases by the more important electrical and mechanical adjustments, and a brief resume of the manufacturer's original specification. Most entries also include details of printed circuit layouts.

RADIO, TELEVISION AND AUDIO TECHNICAL REFERENCE BOOK — Ames

To reflect the changes in hardware and maintenance practices, it was decided to publish this new reference book to serve firstly the needs of the technician who has to operate and maintain electronic equipment, and secondly, those of the engineer and designer.

MASTER CREATIVE TAPE RECORDING — Gardner

In this book the theory of recording and reproduction is covered, as well as the choice of your machine and microphone, improvising a studio, and setting up of equipment. Guidance is given on the general organisation of recording sessions, and on the problems of recording drama, features and music, and of tape editing.

BEGINNER'S GUIDE TO INTEGRATED CIRCUITS — Sinclair

INTEGRATED CIRCUITS are more complex and versatile than equivalent circuits using discrete components. Yet at the same time they are smaller, cheaper and more reliable. There is now hardly any item of domestic electronic equipment not incorporating at least one integrated circuit.

The book is for the comparative newcomer to electronics, with some knowledge of transistor circuits, wishing to move on to an understanding of integrated circuits. Ian Sinclair first describes their principles and construction, then moves on to their many different uses. Many examples are given of practical integrated circuits. Both linear and digital integrated circuits are covered, and there is a brief

introduction to digital circuit techniques for the beginner unfamiliar with this type of circuit. The operation and uses of several specialised types of integrated circuits are also described. The book is copiously illustrated.

BEGINNER'S GUIDE TO RADIO — King

This new edition of BEGINNER'S GUIDE TO RADIO continues the work of its predecessors, which have given many thousands of readers a sound basic knowledge of radio principles and practice. Gordon King has again competently rewritten the text in order to keep up to date with radio technology while reorganising and improving the description of fundamental principles.

The book takes you in logical steps from the theory of electricity and magnetism to the sound you hear from the loudspeaker. It describes the nature of the radio signal, what is involved in transmitting and receiving it (including stereo broadcasting), and what kinds of equipment are needed. Then it examines the components of a receiver, and how they are built up into circuits that will do the various jobs required. Finally, it outlines the improvements that are incorporated in modern (especially hi-fi) receivers and loudspeakers.

Written in a non-technical, highly readable style, with a minimum of mathematics this guide provides the newcomer to radio with an enjoyable introduction to the subject. It will open the door to further reading and to greater skill in handling radio equipment, whether for work or leisure.

RADIO CIRCUITS EXPLAINED — King

Circuits used in modern radio receivers are examined in detail ranging from the simple transistor radio to the specialised hi-fi receiver. The book will provide a clear understanding of principles and operation and design parameters of contemporary sets. Invaluable to radio and audio service technicians, to the student and to anyone interested in radio.

110 INTEGRATED CIRCUIT PROJECTS FOR THE HOME CONSTRUCTOR

A completely rewritten edition containing a practical introduction to five specific integrated circuits. The projects range from simple low-level ones (flam to precision measuring and indicating instruments, and include a host of hi-fi useful projects. All integrated circuits are commercially available and all circuits have been fully evaluated by the author. The book should be of equal interest to the amateur, the student and the professional engineer.

OP-AMPS — THEIR PRINCIPLES AND APPLICATIONS — Dancs

This book is intended for home constructors and other electronics enthusiasts who require information on operational amplifiers in order to use them in non-conventional circuits. The text is written in an easily readable and non-mathematical style and is profusely illustrated with helpful circuit diagrams. A useful glossary of terms is included.

Please send me the following books . . .

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36687H ()	Newnes Tape Recorder Servicing Manual 2nd Edition — Vol. 2	\$17.50
43795H ()	Radio, Television and Audio Technical Reference Book	\$57.50
34322L ()	Master Creative Tape Recording	\$ 6.00
38453H ()	Beginner's Guide to Integrated Circuits	\$ 7.00
49129H ()	Beginner's Guide to Radio 8th Edition	\$ 7.00
36909H ()	Radio Circuits Explained	\$12.50
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SIDEBAND SE-502 B 23 CH. USB / AM 240V AC / 12V DC SWR / RF Meter 28.3-28.6 MHz	160.00
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YAESU MUSEN FT-101E 10-160M AC / DC transceiver w / Speech processor		POA
YAESU MUSEN DM-901D Deluxe AC / DC 160-10M DIGITAL transceiver		POA
YAESU MUSEN FT-7 Mobile 80-10M 20W 12V DC transceiver		POA
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VO-381	10m x 25W	\$319
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YP-150	10m x 25W	\$187
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AUSTRALIAN DXCC TOP LISTINGS AS AT 23-6-78

PHONE			
VK6RU	322/354	VK2APK	300/313
VK4KS	320/339	VK4FJ	297/324
VK3AHQ	314/341	VK4PX	297/304
VK3MS	319/344	VK8L	285/301
VK3AND	304/329	VK5AB	293/315
VK4CS	301/326		

CW			
VK2EO	317/348	VK3XB	280/300
VK3CL	308/337	VK3HC	286/287
VK3JH	308/331	VK8RU	287/296
VK3YL	289/322	VK4RF	282/279
VK4FJ	287/329	VK4XK	281/286
VK2APK	281/304	VK3YD	258/281

UPPER			
VK8RU	322/354	VK4PK	304/315
VK3RU	321/345	VK4UC	304/310
VK4SD	318/338	VK2SG	301/311
VK2APK	311/328	VK3YL	300/323
VK6MK	310/327	VK4RF	292/309
VK4FJ	308/341	VK3XB	286/308

DXCC NEW MEMBERS SINCE 24-6-77

PHONE		Tally	255
VK4VC		..	110
VK2YO		..	120
VK4AAU		..	130
VK3AGB		..	100

OPEN			
VK7BC		..	129
VK6FI		..	107

CW			
VK4LV		..	103

See previous AR for General Rules for ARI HF Awards.

WORKED ALL ITALIAN PROVINCES (WAIP)

1 The WAIP is issued to those amateurs who can show confirmation of a two way contact on the HF bands since 1-1-1948 with —

- a fixed amateur station in at least 60 provinces of the Italian Republic, for foreign amateurs;
- a fixed amateur station in at least 75 provinces of the Italian Republic, for Italian amateurs.

2 The same station may be worked twice or more, if in different provinces.

3. The minimum reports considered are: RST 339 and RS 33

List of Italian Provinces

Agripanto	Messina
Alessandria	Milano
Ancona	Modena
Astoria	Napoli
Azzio	Novara
Ascoli Piceno	Nuoro
Asti	Oristano
Avellino	Padova
Bari	Palermo
Belluno	Parma
Benvento	Pavia
Bergamo	Perugia
Bologna	Pesaro
Bolzano	Pescara
Brescia	Pescara
Brindisi	Piacenza
Cagliari	Pisa
Caltanissetta	Pistoia
Campobasso	Pordenone
Caserta	Potenza
Catania	Ravenna
Catanzaro	Reggio Calabria
Chieti	Reggio Emilia
Como	Rieti
Cosenza	Roma

Cronoma
Cuneo
Enna
Ferrara
Firenze
Foggia
Forlì
Frosinone
Genova
Gorizia
Grosseto
Imperia
Isola
L'Aquila
La Spezia
Latina
Lecce
Livorno
Lucca
Macerata
Mantova
Massa
Matera

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Siena
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Terni
Torino
Trapani
Trento
Trieste
Udine
Varese
Verona
Vicenza
Viterbo

HEARD ALL ITALIAN PROVINCES (HAIP)

1. The HAIP is issued to those SWL who can show confirmation of a HRD since 1-1-1948 of —

- a fixed amateur station in at least 60 provinces of the Italian Republic, for Italian amateurs;
- a fixed amateur station in at least 40 provinces of the Italian Republic, for foreign SWL.

2. The list of provinces is the same as for the WAIP.

3. The HAIP is divided into four classes:

- Phone — one band.
- Phone — two or more bands.
- CW — one band (at least 10 HRD's on CW on the same band; the other HRD may be on Phone).
- CW — two or more bands (at least 10 HRD's on CW on two or more bands).

Starting 1-1-1978 DAIP and HAIP awards can be endorsed for single band and/or for all Italian provinces.

WICEN

AN ABBREVIATED EMERGENCY PROCEDURE

The NSW WICEN Committee was asked to provide communications for the Schofield Air Show in October 1977. With no other guide available it was decided to use conventional procedure to handle formal type of traffic but it soon became obvious that a less formal, more efficient procedure was required to handle the traffic. Since the organizers of the Air Show were used to a very aeronautical procedure they suggested that we could improve our efficiency if we changed our procedure. This was tried and proved on the second day to be an effective procedure for rapid emergency communications.

For those who have not listened to aeronautical communications the relevant principles are that it is a controlled net where sub-stations' call signs only are used since it is implicit that they are in contact with the control station unless stated otherwise. When a sub-station wishes to call control he does so by stating only his call sign and control indicates that he may transmit by replying the call sign. If control requires confirmation from the sub-station he gives this by stating only his call sign. To signify the end of his transmission the sub-station states his call sign. The following example shows how this can be done in a WICEN operation or exercise and comply with the regulations as long as control identifies the net every two minutes. The regulations do permit abbreviated call signs to be used and two possibilities are to use the last letter of the call sign only if there are only a few stations in the net, or if there are more stations the last two or three letters of the call sign can be used. The latter has the advantage that the operator can readily recognise his own call sign even in the presence of interference and distractions.

Sub-station calls control — Bravo Mike Mike.

Control acknowledges — Bravo Mike Mike.

Sub-station message — Can you advise duration of exercise. Bravo Mike Mike.

Control message — Exercise will end at 18.00. Bravo Mike Mike.
Substation acknowledges correct receipt of message — Bravo Mike Mike.

It will take some time for operators to change from normal amateur procedures but I suggest you try it for your next exercise in case you need it in an emergency to handle large volumes of traffic.

Mike Richter VK2BMM,
NSW WICEN Deputy Co-ordinator.



WICEN operators at Schofield Air Show.

MAGAZINE INDEX

Syd Clark, VK3ASC

73-October 1977

Communicate on 10.25 GHz; Home Brew Till-Over; Minimise Feedline Loss; How About 8 PM; WAS Easy; Feed the Wire Wizard; Ultra Simple Diode Checker; Beat the PC Shortage; Identify the Transformer; Sub-Audible Tone Encoder; Build a Com-Coder; Attache Case Portable; Build a Beep Alarm; Try Your KIM-1 on RTTY; SD Sales 2-80 Review; This Your Pix with a Micro; Mastering Network Operations; Try a Trapped Dipole; Liberate Your Wilson HT; Novice Antenna Specials; Sound Operated Relay; Traffic Handling Explained; The Third Hand, Vehicle Security System; One Cent Channels for the IC-22S; The Missing Length; Design a Circuit Designer; Sensitive Meter Saved; Big Bust in Amarillo; Right Way Wrong Way, Navy War; Living with the Family Ham; Add Jazz to Your Tempo; Interested in Television; Simple Electronic Sign; Digital to Audio Decoder; Synthesise Yourself

BREAK IN January/February 1978

Amateur Radio Expedition to Raoul Island; Membership; Using the SL600 Series ICs; A Mobile Voltage Regulator; Vertical Antennas; Vertical Horizontal Antenna Rotator

HAM RADIO January 1978

Broadcast Quality Televison Camera; Microstrip Transmission Lines; Microwave Path Evaluation; Low-Band Solution SSB Phasing Techniques; Test Generator for RTTY; Microwave Bibliography; Gains Field Effect Transistor; New Operational Amplifier Challenges the 741; Microprocessors: A Microprocessor Controlled Keyboard

QST—January 1978

The El Paso Solar Powered Repeater; The Ground-shade Antenna, A 220-MHz Transist Converter; Twisted Wire Quadrature Hybrid Directional Couplers; An Inexpensive Morse Keyer; The Women Among Us; From a Female Viewpoint: Public Service Service with You, Successful Museum Exhibit, How to Avoid Ropoff, Rain of Terror; It's Been Quite a Year, A Brand New OSCAR Pt. 1, My Amateur Radio Demonstration, The Great Idea, What's Your Serial Number, Code of Ethics Update; Moved and Seconded, Radio Jammers Closed Down, Operation by Allen Amateurs in the United States, 1978 Novice Round-Up Announcement, Results, 1977 September VHF QSO Party

RADIO COMMUNICATION February 1978

Audio Filters as an Aid to Reception, An Experimental Power Amplifier for 144 MHz Using a Power FET, A 12V Powered NICAD Charger; Microwave Path Checking, Some Meteorological Aspects of the Anomalous Propagation of Radio Waves.

Pye Overland FM700 Transceiver, hybrid, ch. 40, 50, R2, R8, 10W output, good clean unit with car cradle and handbook \$60, TCA 1675 unit, ch. 40, clean, \$40 VK3ACM, QTHR Ph. (057) 68 2800, evenings.

Collins KW2M 55B Tcr with Collins AC power supply, apr. Collins Samsonite CG-1 carrying case with new Shure 404C mic., had very little use, exc. cond., as new condition, \$1,685, also brand new Drake T4XC Tcr, 10W and 100W, and 110V factory installed. Drake AC power supply, Drake R4C Rcr with Drake noise blanker, Drake filters, extra receive v.t.s., including 160 and 11m, full international shortwave and marine band, VVV, all Drake factory installed, new Shure 404C mic., included, \$1,795, also used Hygain TH Yagi with owner's manual and Hygain Balmalan, \$75, James Gaudin VK2JD Ph. (02) 36 7796.

Pye Cambridge 2m FM Carphone with mic. and manual \$35, 1675 low band AM carphone with manual \$30. Heathkit HW-32A, 20m mono band transceiver mic. and manual only. Best offer. Cols for 80 and 40m also included. FT-DX-401 transceiver with noise blanker and speech processor, good cond., \$385 or best offer. VK3AGD, QTHR.

Yaseu FRQT Rcr, \$220, BWD C90 SRC with probes, \$450, RF oscillator Tech TE200, \$45; multi-band portable Rcr, \$30; Lenco L84 auto tuner, \$150, C90 RcrTx (no. power supply), \$15. Eltham Ph. (03) 438 1827 A.H.

Set of Asahi Mobile Antenna \$50 to 10, complete with bracket, etc. \$50, matching balun for same \$15. Waters con. preamp, \$20; Shure 444 microphone little used, \$35. VK3TQ, QTHR Ph. (058) 52 1638.

Multi 7 2m Transceiver, 40, 50, R1, R2, R3, R4, R5, R6, R7, R8, \$170; Lafayette HA-400A communication receiver with external speaker, \$180. Both multi condition VK2BOD Ph. (02) 727 3272.

Yaseu FL2100B, 2y-cw, new 572Bs, excellent cond., 400W PEP on all bands 80-10, 400 or close offer. Elmac 4125 Tetraods suit HF or VHF PA, new with socket, \$20; AWA 85500 with two wire working RCIA remote control and two channel channels, \$170, 7 & 8 supplied, \$100, ONO spare 8/40, 8/46B and 8/72B v.s., new and used, offers? Contact VK3DT, QTHR Ph. (055) 27 3166, Bus.

Cleaning Out Shack - New 100PF Johnson Tx cap, \$5; AWA 25m 25W lo-band PA and exciter boards (data available), \$40, Collins mech. filter, 455 kHz, \$30; power transformers, Send a s for full list. Mark Webster VK2BAK, QTHR Ph. (02) 48 6241.

Hammerlund HQ170 Rcr, 1.8 to 54 MHz, \$200; HX300 Tx, \$200, or \$300 pair, Hallicrafter HT32 Tx, 240V, requires 110V for fan \$100, SX115 Rcr, 110V transceiver, \$200, or \$250 pair; 70V AVO meter EA113 \$100; AVO model 7, \$25; "Microton" translator tester, \$20; Pat Asby Ph. (057) 57 5033, VK2JA, QTHR Ph. (02) 579 5718.

Europa-8 2m Transceiver, 200W PEP output, with spare tubes, only 16 hours use. VK2JAT, QTHR Ph. (044) 26 111 (Bus.), (044) 22 788 (A.H.).

Stale Lark VK2JOD, FL2100B linear in mint condition, with manual, less than 10 hours use, for quick sale, \$400, VK2OL, QTHR Ph. (02) 78 6861.

ICDM IC32A 2m Transceiver, repeaters 2 to 8, simplex 40, 50, 51, mobile bracket and mic., good cond., \$150 VK2BAD, QTHR Ph. (02) 72 1107.

Yaseu FT191B, excellent cond., with instruction book and mic., \$500. Reg Jones VK2AGP, QTHR Ph. (02) 72 1107.

FT301D and matching power supply, \$1,000; FV301, remote VFO, \$125. All units as new VK3TQ, QTHR Ph. (058) 52 1636.

Hygain 2 Element Quad, 10-15-20m, almost new, with 25 foot triangular steel tower, has ball-tac facility for extending higher, \$250. Ph. (053) 59 9298.

Galvanised Tower with all hardware, crank-up, guyed 7 ft, up 25 ft down, shifting QTH, \$250, or I will swap for Enotator 502CXQ rotator or similar machine to heavy duty VK3TQ in working condition. Contact G. Stevens VK3ZG, QTHR, or C. Radley USP Shepparton for details Ph. (054) 21 4477 (Bus.).

FTDX100, good condition, AC/DC, complete, \$375, ONO, VK3ADW, QTHR.

Howlett-Packard 356C and 356D, variable attenuators, DC to 1 GHz, as new, \$110 for both; Ham-It rotator, brand new, \$160, VK1VP, QTHR Ph. (062) 48 5882, A.H.

KW77 Rcr, covers amateur bands 160-10m, Crown-cord CTR 5400 battery operated 5 in. reel to reel portable recorder, Telefunken Magnetophon 204 stereo 7 in. reel to reel recorder, all in good condition. Offers to 1308 Glenhumbly Road, Glenhumbly, Vic 3163.

Yaseu FT181E Transceiver, current model, with spare set of 3 new valves, \$750, Yaseu FV101B, external VFO, \$110; Yaseu VC610, digital display, \$210. All equipment "mint" condition VK3SB, QTHR Ph. (03) 590 3521.

WZAP Balm, new, in original package. Ken product 3 phase processor, Model KP-12A, used less than ten hours. Roth Jones, VK3BG, 23 Gaudin Rd., Doncaster East 3109.

Yaseu FT301D Transceiver, complete with matching deluxe FV301D power supply, one month old. Cost \$1,440, sell \$1,200, ONO P. Drady VK2NIE, Gillard's Rd., Lower Box 2493 Ph. (066) 54 3206.

10m Transceiver, exc CB, 23 ch., 12W PEP, 240V AC/12V DC, built in SWR meter, \$160, also Midland 13-892 24 ch. 12V DC only, \$140. Ian VK3HCY, Box 322, Mentone, 3194.

Aeshi, 14 MHz, 3 el., full sized beam, 18 ft boom, gamma match (no balun required), 25 dB front/back ratio, VSWR 1.5:1 or better, covered, complete with carton and instructions, \$155; \$3, 14 MHz mini-beam (Zyl beam as per Radio Communications), good performer for restricted space, light weight rotator, \$85 VK3ARZ, QTHR Ph. (03) 232 9492.

Yaseu FLDX2000 Linear, 1200W PEP, excellent condition, \$225 VK3CR, QTHR Ph. (03) 772 4009.

Standard RS-C145B 2m FM 5 ch. Hand-held Tcr, with nicad battery, AC charger and stand, etc. (mic. case, English manual, \$145. VK6PY, QTHR Ph. (09) 271 7182.

Tentec 844 Triton IV, includes noise blanker, CW filter, special electro-voice microphone and AC power supply, 25W amp circuit breaker fitted, \$300. Henry Ph. 1978, VK2JZP/VK5NJP, QTHR (no VK5XT) Ph. (08) 31 1638.

WANTED

Self-supporting Telescope Tilt-over Tower, to 35 ft extended, if fitted with heavy duty rotator will purchase that as well. Will pay top price for the right tower. Sufficient dismantling by the seller will be required to facilitate shipping to my QTH. VK2BFJ, QTHR Ph. (043) 32 5758.

Anyone going solid state? Crystals for AWA MR8A on 2m FM wanted, channels R3, 4, 5, 6, 7, 8, 40, 40, 51, 52, V. David VK3ZDT, Ph. (03) 439 9649.

FT101B or similar, suit Novice, Rcr covering amateur bands, rotator for small beam, freq. meter 3-30 MHz. Details to VK3NII, 54 Spruham Ave., Norlane 3214.

Any Amateur Radio Gear in any shape or form for the Royal Melbourne Institute of Technology's Amateur Radio Society, VK3AMT. We have no gear and would like to get back on the air and have some notes with other school societies and amateur stations. Bruce Kendall VK3ZDM, QTHR Ph. (03) 741 2382.

Help from Six Metre Operators to buy Yaseu FV506B to send to VRODX. Seen already in on the scheme (VK301, 3AMK, SACK, SA9D, 322K, 88V, 80R), 12 more required. Aim is to have a fm rig to loan for DX purposes to any worthy cause. You will have a say in its use and get the new country on air. Contact VK30T, VK3AKK or VK3AMK if you wish to help.

FT290 Transceiver, complete with PS mils, manual and in good order. VK2AFP, QTHR Ph. (098) 65 621.

IC32B, reasonable cond. VK5ZAT, Ph. (08) 277 6441 A.H.

FV408, ext. VFO or circuit diagram, to buy or borrow. For copying VK3LP, QTHR.

FV75B or suitable HT transformer for same. VK4MAX, 23 Drummer St., Tooloos Est., Gladstone 4680.

SILENT KEYS

It is with deep regret that we record the passing of—

Mr. E. B. WHITE, M.B.E. VK2HA
Mr. R. E. EDELSTON-POPE VK3ARP
Mr. R. D. TRACY VK3ART
Mr. M. BROWN VK3AR

RICHARD EDELSTON-POPE VK3ARP
Many members will be saddened to learn that Dick Pope finally succumbed to a long-standing heart condition on 17th April, 1978. His cheery personality and wise counsel will be missed by very many amateurs, both locally and around the world.

Dick was brought up in Sydney, where he was actively interested in ham radio well before the Second World War. He obtained a Diploma of Commerce from Sydney and, during the war years, he served in the Royal Navy, first in the North Atlantic and then in command of a group of naval vessels engaged in escort and mine-sweeping duties in the Mediterranean Sea. He was awarded a DSC for his services before and during each of the Allied landings in Italy and South America and became known as "D-Day Dick".

In 1948 he came to Melbourne to take a leading part in the setting up of TAA, becoming Director of Finance and Administration.

Dick took out his ham licence in 1950 and quickly made many firm friends. He was very active in construction work and for a time was Acting Treasurer of the WIA Victorian Division. He was, incidentally, very active as a worker for the Legacy movement.

Our sympathy goes out to his wife, Isabella, and his family.

Very many of us have lost a very good friend.

Alan H. Reid VK3AHR.

Matching VFO and Speaker Unit for Uniden 2820. Write details J. Moye VK4ZT, QTHR.

Ham II, complete with indicator and control cap a VK3AMC, QTHR Ph. (03) 92 9038.

Kenwood TS-680B in good working condition, 1-2 years old, also components suitable for linear ceramic capacitors 001 up, 5 kV x 2 variable capacitors (1), 10 pF-300pF (2), 1000 pF, both HV spacing and large capacitors suitable for power supply (2 x 8 mF), 7.5 kV sets and dimensions to VK4EBS QTHR Ph. (07) 351 3288.

Has anyone and old faulty 80m Resonator Coil from an 18 AWT/7B they would let me have urgently? Also wanted 30K1 linear, any cond., even faulty. But complete VK3LN, QTHR Ph. (071) 82 2673.

EXCHANGE

Exchange Atlas 215 for an Atlas 210. My Atlas 215 is about 2 years old and is a 1st class cond. VK4KT, QTHR Ph. (074) 62 2389.

TRADE HANDBOOK

For a very long time commercial advertising has not been accepted in *ARR Handbook*, but as the result of discussions at the 1975 Federal Convention a decision was made to open up a "Hamads-Trade" section. The rate will be \$10 for 4 lines plus \$2 per line (or part thereof), minimum charge \$15, pre-emptive. Copy is required by the first day of the month preceding publication. This will mean that in future ordinary Hamads submitted from members who are deemed to be in the general electronics retail and wholesale distributive trades should be handled as relating only to private articles not being re-sold for merchandising purposes.

VICOM WON'T SELL YOU A RIG IN A FACTORY-SEALED CARTON!

When you purchase your ICOM, YAESU and KENWOOD product from VICOM, please don't expect to receive it in a factory-sealed carton. When we despatch any of these fine pieces of equipment to you we want to be certain it meets or exceeds the manufacturer's specs. We thoroughly pre-delivery check all transceivers before shipment and back this up with our VICOM 90 day warranty.

If getting a super discount from a backyard "bootlegger" show is important to you - or if you insist on a factory sealed carton from a supermarket, we suggest you shop elsewhere.

But if you want the positive assurance that you are receiving the value and performance you're entitled to plus ethical business conduct - then VICOM is the supplier for you!

accessories

MORSE KEYS

HK702 deluxe Key with marble base	\$25.00
HK708 economy Key	\$19.00
HK705 operators Key	\$20.00
MK701 man du stor (side-sweeper)	\$38.00
EK103W electronic Keyer	\$150.00

CONVERTERS

44MHz, into 28MHz IF	\$68.00
432 MHz into 28MHz IF	\$69.00
298 MHz into 28MHz IF	\$65.00

2m LINEAR

QM70 high power, 70w pep max, 2 metres	\$129.00
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LOW PASS FILTERS

#030DM 32MHz Fc 1 Kw max 3 stages	\$30.00
#030LS 32MHz Fc 200W max 3 stages	\$79.00

SWR/PWR METERES

VC2 10m meter, 3 150MHz	\$34.00
Cable/Bridge SWR200, 2 200MHz	\$79.00
SW10A 140-500 MHz dual by	\$85.00
SW10A 1.8-150 MHz 20/120W d rect reading	\$79.00
SWX 77 professional 1.8 30MHz	\$125.00

MICROPHONES

VM-1 noise-canceling dynamic, low Z	\$8.90
VM-2 desk mic dynamic with preamp low Z	\$29.90

BALUNS

AS-8 for beams	\$31.00
B-50A 50 ohm 4Kw mode or dipole	\$26.00
B-70A 70 ohm 4Kw mode or dipole	\$26.00

antennas

TRAP VERTICALS

14VR Nagara 40 10m 5 2m high no guys	\$95.00
14VR Nagara 80 5m 6 7m high no guys	\$129.00
14A/VQWB Hy Gen 4m 10m 10m	\$106.00
18A/VQWB Hy Gen 4m 10m 10m	\$149.00

hy-gain
Amateur Radio Systems.

NEW SHIPMENT

HF BEAM ANTENNAS

16DXX Hy Gen Thunderbolt 10 15 20	\$366.00
16J3R Hy Gen 10 15 20 3e	\$209.00
16M3K Hy Gen 10 15 20 3e	\$279.00
203BA Hy Gen 3e monobander 20m	\$199.00
204BA Hy Gen 4e monobander 20m	\$299.00

6Y 2m Jaybeam 7.8dB Length 1.6m 5e	\$35.00
6Y 2m Jaybeam 9.5dB Length 1.2m 5e	\$45.00
10Y 2m Jaybeam 11.4dB Length 4.4m 10e	\$77.00
OKY 2m Jaybeam Xtrap 11.3dB 10e	\$89.00
AS210BW Aash twin 10e 18dB gain	\$119.00

HF MOBILE ANTENNAS

RL-ST-14	
RM10 10m Resonator	\$16.00
RM15 15m Resonator	\$16.00
RM20 20m Resonator	\$16.00
RM50 50m Resonator	\$20.50
RM50 50m Resonator	\$22.00
M02 fold-over mast	\$29.00
BM 1 bumper mount	\$24.00
MARK H.CALCS	
HW40 40m top loaded	\$30.00
HW20 20m top loaded	\$30.00

MOBILE WHIPS

2m ANTENNAS

The RINGO RANGER ARX 2 is a 2m gain omnidirectional antenna with three half-wave in phase and a one eighth wave matching stub. The Rings Ringer gives an extremely low angle of radiation for better signal coverage. It is tunable over a broad frequency range and perfectly matched to 52 ohm coax. Price \$48.

6dB gain with reference to half-wave dipole	
6dB gain with reference to quarter-wave whip	

London 2m mobile whip	\$35.90
Scalar 1/2 wave whip, 2 metres	\$2.50
Scalar 5/8 wave whip, 2 metres	\$16.70
Magnetic base KLMG	\$18.00

70cm BEAMS

80/70cm Jaybeam, 88el 18.5dBd gain	\$98.00
48 70cm Jaybeam 48el 15.7dBd gain	\$76.00
PRM15 10cm Jaybeam 14.9dBd gain 18el	\$89.00
DS 70cm Jaybeam twin beam 12.3 dBd gain	\$89.00
P8A1200 Duoma Parabolic dish, also 1 2GHz	\$348.00

TRAP DIPOLES

Midy V/N 80-10m trap dipole	\$69.00
A-480 X4 40 and 80m trap dipole	\$99.00

DIPOLES

A4VPH 40m dipole kit	\$29.00
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NEW ITEM



DAIWA

QUALITY antenna change-over relay

Two new models
Model CX 2L
Frequency Range: 1.8 thru 170 MHz
Power Rating: 100w pep
Power Req'd dc 10-15V
Price: \$45
Model CX 2H
Frequency Range: 1.8 thru 450 MHz
Power Rating: 200w pep
Power Req'd dc 10-15V
Price: \$59.

RINGO

AT200 matching antenna tuner	\$1172.00
SP820 matching speaker for TS820s	\$747.00
	\$249.00
	\$483.00
	\$309.00
	\$58.00
	\$16.00
	\$189.00
	\$58.00

KENWOOD

TS820S HF transceiver digital	\$1172.00
TS820S HG transceiver 160-10m	\$747.00
TS100 6m transceiver	\$249.00
TR400 2m digital mobile transceiver	\$483.00
TR7500 2m mobile synthesized transceiver	\$309.00
MC50 desk mic	\$58.00
MC10 pin hand mic	\$16.00
AT200 matching antenna tuner	\$189.00
SP820 matching speaker for TS820s	\$58.00

YAESU

FT10B transceiver, 160 thru 10m	\$899.00
FL2100B HF transceiver	\$579.00
FRG7 Comm call can Receiver	\$349.00
FT7 HF mobile transceiver	\$569.00
FT901DM HF transceiver	\$175.90
VO30P 10m microphone	\$349.00

ICOM

PORTABLES AND ACCESSORIES

IC202E 2m ssb portable	\$219.00
IC502 6m ssb portable	\$219.00
IC215 2m fm portable	\$219.00
IC200 2m fm pack with Charger	\$57.00
IC502 6m ssb	\$54.00
IC501 6m ssb near 10w out	\$98.00
IC201 2m ssb near 10w out	\$98.00
mobile mucklets for portables	\$17.00
2m TRANSCEIVERS	
IC245 2m fm dig tal mobile	\$450.00
IC211 2m fm mode transceiver	\$750.00
IC225 2m fm mode	\$299.00

90-DAY WARRANTY ON ALL NEW PRODUCTS

SPECIAL

VOX 3 v Gx attachment for TS700A transceiver	\$20.00
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PROCESSORS AND COMPRESSORS

MC330 audio mic compressor	\$71
RF440 rf processor ac/dc	\$119
RF550 rf processor with crystal filter	\$159



QUALITY DAIWA
4 position quality coax switch
frequency range up to 500MHz
high isolation unused outlets grounded
insertion loss better than 0.2dB
modulus 50 ohms
contact resistance 20m ohm
commercial quality
Price \$49.90

WARNING! The law requires that a licence be held for all transmitting equipment

Head Office and Mail Orders

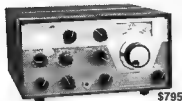
Direction Russell J. Kelly
Peter D. Williams

vicom Ph (03) 699.6700
68 Eastern Road
Sth Melbourne Vic. 3205
Adelaide 43.7981 Canberra 82.3581 Perth 448.3232 Brisbane 38.4480 Hobart 43.6337



**DRAKE**

C-Line Amateur Equipment

**\$795**

Drake R-4C

Solid State Linear permeability-tuned VFO with 1 kHz dial divisions. Gear driven dual circular dials. High mechanical, electrical and temperature stability.

Covers ham bands with crystals furnished. Covers all of 80, 40, 20 and 15 meters, and 28.5-29.0 MHz of 10 meters.

Covers 160 meters with accessory crystal. In addition to the ham bands, tunes any fifteen 500 kHz ranges between 1.5 and 30 MHz. 5.0 to 6.0 MHz not recommended. Can be used for MARS, WWV, CB, Marine and Shortwave broadcasts.

Superior selectivity. 2.4 kHz 8-pole filter provided in sub positions. 8.0 kHz, 8-pole selectivity for a-m. Optional 8-pole filters of .25, 5, 1.5 and 6.0 kHz bandwidths available.

Tunable notch filter attenuates carriers within passband.

Smooth and precise passband tuning.

Transceive capability may be used to transceive with the T-4X, T-4XC or T-4XC Transmitters. Illuminated dial shows which PTO is in use.

Use Iso a-m and cw on all bands.

Agc with fast attack and two release times for s-b and a-m or fast release for break-in cw. Agc also may be switched off.

New high efficiency accessory noise blanker that operates in all modes.

Crystal lattice filter in first IF prevents cross-modulation and desensitization due to strong adjacent channel signals.

Excellent overload and intermodulation characteristics.

25 kHz Calibrator permits working closer to band edges and segments.

Scratch resistant epoxy paint finish.

**\$695**

Drake T-4XC

Solid State Linear permeability-tuned VFO with 1 kHz dial divisions. Gear driven dual circular dials. High mechanical, electrical and temperature stability.

Covers ham bands with crystals furnished. Covers all of 80, 40, 20 and 15 meters, and 28.5-29.0 MHz of 10 meters.

Covers 160 meters with accessory crystal. Four 500 kHz ranges in addition to the ham bands plus one fixed-frequency range can be switch-selected from the front panel.

Two 8-pole crystal lattice filters for sideband selection.

Transceives with the R-4, R-4A, R-4B, R-4C and SPR-4 Receivers. Switch on the T-4XC selects frequency control by receiver or transmitter PTO or independently. Illuminated dial shows which PTO is in use.

Use Iso a-m and cw on all bands.

Controlled-carrier modulation for a-m is compatible with s-b linear amplifiers.

Automatic transmit-receive switching. Separate VOX time-delay adjustments for phone and cw. VOX gain is independent of microphone gain.

Choice of VOX or PTT. VOX can be disabled by front panel switch.

Adjustable pi network output.

Transmitting a-c prevents flat-topping.

Meter reads relative output or plate current with switch on load control.

Built-in cw sidetone.

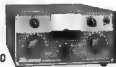
Spotting function for easy zero-beating.

Easily adaptable to RTTY, either fsk or a-fsk.

Compact size rugged construction. Scratch resistant epoxy paint finish.

**\$165**

MN-4 (Mode No. 1507)

**\$310**

MN-2000 (Mode No. 1509)

Drake MN-4 & MN-2000 Matching Networks

• Integral Wattmeter reads forward power in watts and VSWR directly. Can be calibrated to read reflected power. • Matches 50 ohm transmitter output to coax antenna feedline with VSWR of at most 5:1. • Covers ham bands 80 thru 10 meters. • Switches in or out with front panel switch. • Size: 5 1/2" x 10 1/2" x 14 0 x 27 3 x 20.3 cm. MN-2000 14 1/2" x 28 5 cm. • Continuous Duty Output: MN-4, 200 watts. MN-2000 1000 watts (2000 watts PEPI). • MN-2000 only: up to 3 antenna connectors as selected by front panel switch.

TVI Filters

Low Pass Filters for Transmitters

have four pre-sections for sharp cut off below channel 2, and to attenuate transmitter harmonics falling in any TV channel and fm band. 52 ohm SO-239 connectors built in.

Drake TV-3300-LP

1000 watts max. below 30 MHz. Attenuation better than 60 dB above 41 MHz. Meets TV-I interference as well as TV front-end problems. **\$32**

Drake TV-5200-LP

200 watts to 52 MHz. Idea for six meters. For operation below six meters, use TV-3300-LP or TV-42-LP. **\$32**

Drake TV-42-LP

a four-section filter designed with 43.2 MHz cut-off and extremely high attenuation in all TV channels for transmitters operating at 30 MHz and lower. Rated 100 watts input. **\$19**

High Pass Filters for TV Sets

provide more than 40 dB attenuation at 52 MHz and lower. Protect the TV set from amateur transmitters 8-160 meters.

Drake TV-300-HP

For 300 ohm twin lead **\$13**

Drake TV-75-HP

For 75 ohm TV coaxial cable, TV type connectors installed **\$17**

**\$47**

Drake MS-4

Drake MS-4 Matching Speaker for use with R-4, R-4A, R-4B and R-4C Receivers. (Has space to house AC-3 and AC-4 Power Supplies).

ELMEASCO**Instruments Pty. Ltd.**

P.O. Box 30, Concord, N.S.W. 2137
Telephone: 738-2888
Melbourne, P.O. Box 107, Mt Waverley, Vic 3149
Telephone: 233-4044
Adelaide 42-6666; Brisbane 392 2884,
Perth: 25-3144.

Write, phone or call for technical information

Prices shown include Tax

The Bulletin

PATRON: His Excellency the Governor,
Air Chief Marshall
Sir Wallace Kyle G.C.B., C.B.E., D.S.O., D.F.C., K of St John.

All material for inclusion in The Bulletin, to reach the Editor by phone, mail, or on air by the 10th of each month. Postal address 22 Salisbury St., Leederville. 6007. Phone 4442909.

Correspondence ; All other correspondence should be addressed to :-

Hon. Secretary,
W.I.A. (W.A. DIV.).
P.O. Box N1002,
PERTH, W.A. 6001.

GENERAL MEETING.

Held on the THIRD TUESDAY of each month at
Science House, 710 Murray St.(formerly Hooper St)
West Perth, commencing 7.45 p.m.

COUNCIL MEETING.

Held on the FOURTH TUESDAY of each month at the
Scout Hall, Cnr JOSEPH AND WOOLWICH ST WEST LEEDERVILLE
commencing 7.30 p.m. OBSERVERS WELCOME.

The following letter was recently received by the President. Please read it carefully and if you have any ideas or are prepared to help in any way CONTACT A COUNCILLOR.

" " " As you know, next year is Western Australia's 150th Anniversary and a wide ranging programme of events is being planned to celebrate the State's birthday.

I understand that the Wireless Institute of Australia is possibly the oldest radio society in the world and wondered whether the W.A. Division would consider promoting some event suitable for this historic occasion.

For example an exhibition spanning early wireless equipment and allied memorabilia to modern electronic communication equipment, and which might be held in conjunction with an international or national conference held in W.A. in 1979. It may be that something of this type would earn the support of Telecom Australia.

I would be pleased to know if the suggestion has interest for the Institute.

S.W. Dallywater .

Director.

At the Council Meeting for April the following Office bearers were appointed.

As laid down in the Constitution, the members present at the Annual General Meeting elected Mr. L.A. Ball, VK6AN President

Mr. A. Maschetti Vice-President.

As insufficient nominations for Council were received in spite of an extended nomination period, it was not necessary to hold a Ballot and the nominees received were elected to Council. They were, in addition to the President and Vice-President, Mr. P. Savage, VK6NCP, Mr. A. van den Avoort, VK6CU, Mr. I. Hillier, VK6LQ.

Hon. SECRETARY:	Mr. P. SAVAGE	VK6NCP	4013912.
Asst. SECRETARY	Mr. B. Hedland-Jones	VK600	
TREASURER:	Mr. A. van den Avoort	VK6CU	2715432
Asst Treas.	Mr. J. Kitchin	VK6TU	3499342
MEMBERSHIP Sec.	Mr. D. Wallace	VK6IW	3413655
Minute Secretary	Mr. M. Cliff	VK6ZKY	2713941
Broadcast Co-ord.	Mr. J. Young	VK6JY	2931109
PROGRAM Organiser	Mr. I. Hillier	VK6LQ	
Equipment	Mr. A. Baxter		3493335
BOOKSALES	Mr. C. Dodd	VK6DV	4465364
CONTEST Mgr.	Mr. C. Waterman	VK6NK	
QSL Manager	Mr. J. Rumble	VK6RU	3859664
* I. W. Co-ord.	Mr. D. Couch	VK6WT	3819242
* Publicity Off.	Mr. D. Dyke	VK6NAD	

* Yet to be confirmed

At this time also the position of Patron is still to be confirmed but it is hoped that the Governor, Sir Wallace Kyle will continue in this capacity.

Thanks to those who stepped forward and offered their services, it is obvious from the above list that they were soon co-opted to Council and provided with tasks. Will someone step forward and offer to be Editor in Chief of the Bulletin ?

* * * * *

HAMADS.

WANTED

WANTED

WANTED

General -coverage Receiver in good working order must have SSB facility and cover amateur bands.
Please state price and details to:-
Mr. K. Sier, 22 Marshall Ave.,

Pinjarra

Phone 095 311946.

* * * * *

REPORT ALL INTRUDERS - - - and this means CB operators who have "overflowed" onto 10 metres and also migrated to 2 metres. Out with the snoop loops. Then phone in your reports to the I.W. Coordinator.

Herewith a brief rundown on the General Meeting held 16th May.

The meeting was opened at 8.00 p.m. with the new President, Les VK6AN in the chair, flanked by the new Secretary Peter, VK6MCP, and new Minute sec, Maurice VK6ZKY. After the minutes of the last meeting had been read and received, apologies were recorded from VK6ZDN, 6HC, 6MO, 6IC, 6NC, 6KW.

The chairman then welcomed the President of the VK7 Division who was among the visitors. He also welcomed students from the Technical Colleges and extended best wishes to those who had sat for the examination during the day.

Correspondence was read and received.

Reports. A brief report from the Treasurer all O.K.

QSL Buro: Don VK6DY, Acting Buro Manager indicated that cards were still flowing freely.

Broadcast Co-ordinator VK6JY said that the three-weekly roster system seemed to be quite popular and suggested that news items be phoned to the Duty B/C officer. He appealed for tapes of a technical nature. W.I.C.E.N. Des VK6SU reminded members of the forthcoming W.I.C.E.N. meeting on Friday 19th May.

Programme Organizer Ian VK6LQ advised the meeting that a video tape of the Amateur Radio segment of "This week has Seven Days" had been obtained and would be shown after the business portion of the meeting. He appealed for lecturers on general topics.

As liaison officer for the MARTG he advised that the Group was currently without premises. Repeater Group Liaison Officer, Adrian VK6CU, reported that Ch4 was currently off the air and had been replaced by Ch6 for testing purposes. The group's A.G.M. would be held on Saturday 20th May. Subscriptions were also due.

I.W. Co-ordinator, David VK6WT, thanked those who had contributed reports during the year and suggested that anyone with a report should phone it to him. He had received a letter from the Federal I.W. Co-ord. VK3LC, together with a supply of report forms. David thanked the News Broadcasters for making available the I.W. slot on the Sunday broadcasts.

Membership Secretary Dave VK6IW was unable to present any new members to the General Meeting due to a technicality. He advised that there were now 321 Full Members, 90 Associate Members, 41 grouped as student, club, pensioners etc and 5 Life Members making a total of 457 as at the April listing.

A motion proposed by Peter VK6HU suspending standing orders allowed the names of applicants for membership to be read to the meeting. They were :-

John Ross Fenwick, Frank Lenzo, Gordon Keith Nichols,
Christopher David Rumble.

Scout Liaison Officer VK6HU informed members that preliminary information regarding J.O.T.A. 1978 would be going forward to scout groups. VK6AN passed on the thanks of the Scout Association Task Force to those amateurs who participated in the Swantiki-WICEN exercise.

The chairman indicated to the meeting that as there were only five elected Councillors, which number also constituted the necessary quorum if any Councillor was absent from a Council Meeting it was likely to cause some delays in handling Institute business. A number of members put forward their ideas as to how the situation could be overcome.

David VK6OM raised the question of personalised vehicle number plates, however it is unlikely that the present system will be altered for some time.

Henry VK6DC again asked that "handles" be included in the VK Callbook.

The meeting was closed by the chairman at 8.45 p.m. and after a brief pause for the usual cuppa members were able to watch the replay of the T.V. programme already mentioned. Our thanks to those responsible for the taping (VK6RH and VK6CU, I think).

MEMBERSHIP SECRETARY'S REPORT.

I submit the following report on the state of the membership numbers for the year ending March 1978, the reason for using March instead of April is that the computer sheets for April do not arrive in VK6 till May which is well after the A.G.M.

This year has shown a better increase in members than the previous year a lower number of unfinancial members in March than the same time last year and this year has seen the Highest total ever of members in this Division of the W.I.A. To help in comparing the increase for this year with the previous year the following figures should help.

		TOTAL MEMBERS	OVERALL INCREASE		NEW MEMBERS	UNFINANCIAL MEMBERS	
1978	March	453	+85 23.1%	108	54	11.9%	
	February	448	+80 21.7%	100	83	18.5%	
	January	434	+66 17.9%	86	229	52.8%	
1977	March	368	+19 5.4%	62	62	16.8%	
	February	373	+24 6.9%	58	88	23.6%	
	January	368	+19 5.4%	52	143	38.9%	

In the above table I have tried to show the increase in members and the decrease in unfinancial members for the last three months of the 1977-78 year as compared with the year 1976-77 (a whole year was not used in the table as the final months show the total increase).

You will see for the year 1977-78 there was an increase of 85 or 23.1% which is about 5 times that of the year 1976-77 increase of 19 or 5.5%. This I feel indicates the interest shown in the W.I.A.

Now when you look at the numbers of new members you will see the total of 108 exceeds that of a gain in membership of 85 by a sum of 23, this is brought about by transfer of members to other Divisions and those who for reasons of their own, resign.

The final figures for unfinancial members shows a lower figure, 54 or 11.9% for this year as compared with 62 or 16.8% for the previous year, although the January figures show that more members paid earlier last year than this.

Of course the increase in new members means the issue of Certificates to them as well as those who change their grade of membership so the numbers will not be the same as new members and also the totals may not be the same as the members at the same time as there have been delays in issuing certificates (running out etc), the following figures will show this:-

Certificates issued.

1978 -- 25, 1977 -- 95, 1976 -- 65.

The issuing of Certificates for new members is not all, the first year's subs have to be paid into the Federal Office bank account - - -

	Members Subscriptions	New Members
1977 -78	\$2371.00	108
1976 -77	\$ 958.00	62

As seen from the above figures not only has the membership increased but the amount of subscription has also increased, so all told there is a great change in this year in the interest shown in the W.I.A. VK6 Division, a change I would like to see continue in the next year. Dave Wallace VK6IW.